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A Sanitary Aspect of Construction.

MODERN investigation and experience in regard to the best conditions for healthiness in hospitals have proved that in regard to such buildings at least it is not only important to consider how completely satisfactory ventilation and drainage are to be provided for, but how precaution is to be taken against the retention of impure matter in the very materials themselves of the building. It is not only a question of how the building is constructed, but of what it is constructed; and one conclusion at least has been unanimously arrived at,—that smooth, impervious, and washable materials are the most likely to answer the desired end. And along with this conclusion is one which almost necessarily accompanies it,—that all receptacles and corners where matter may be collected and be difficult to dislodge are almost certainly of an injurious tendency. The medical part of the testimony is unanimous on this point.

All dwellings are not hospitals; but it may be worth consideration whether some of the principles which are regarded as *de rigueur* in the case of hospitals ought not to be to a certain extent acted upon in regard to all buildings for human habitation, as far, at least, as is consistent with convenience, comfort, and a reasonable economy in regard to the general uses of a habitation.

Every house which is fairly well built and finished in the ordinary methods looks sound and healthy when new. It is when such houses come to be examined after a certain lapse of time, for a new tenant, or for purposes of valuation or dilapidation, that the inherent defects of ordinary building are so prominently brought out. Every one who has had to survey old house property, especially in the smaller streets of large towns, knows how many things there are in such houses which are certain to be found in a state of dilapidation. Wainscots and skirtings are broken and started from the floor, and conceal behind them long passages and crevices where all kinds of minute *débris* have accumulated unknown and unremovable. Casings have never been properly fitted or backed, and through the decay of wood blocks are loose in their seat, and leave gaping crevices between the woodwork and the plaster; chinks for which the only good word that can be said is that they sometimes afford compulsory inlet ventilation when otherwise there would be no such thing. Chimneypieces are in like manner whited sepulchres, which mostly do not even appear "beautiful outward"; they are all in slabs one of which is sure to have got loose, having been badly set originally, and is either gone, leaving an unsightly gap into the regions behind this arrangement of slabs, or is knocking about half in its place and half out. The papers are thick upon the walls one over another, forming so many layers of semi-decayed and sometimes even putrid paste and paper. And what goes on between the ceiling joists and the flooring-boards, who can tell? The house is full of spaces which no one can get at to clean them, and of constructions which have been essentially rickety at first, though looking well enough when quite new and covered with fresh paint, but which are now ragged, and shaking in their places.

All this, of course, may be a providential arrangement for securing work to repairing joiners and to "dilapidating" surveyors, but in an economical point of view no other class of person, except the original speculating builder who produced the structures, is likely to find a good account in it. There is, however, another view of the matter which is even more important than the economical one. The difficulty of keeping houses healthy (apart from drainage questions) is undoubtedly very much greater in a crowded town than in the country. The population is much denser, the air is laden with impurities of smoke, of dirt and dust, of human and animal emanations, all of which find a lodgment somewhere until cleaned off or otherwise dispersed; and if not cleaned away attach themselves to and become almost a part of the softer and more porous materials, which thus become radically unwholesome portions of the structure.

To avoid this the great desideratum would be that there should be as few porous substances and as few concealed and un-cleansable places as possible in which impurities can lodge. It may be added that a great part of the depressing effect in the lower parts of crowded towns arises from an aspect of squalor and dilapidation, which is owing in great degree to the employment of methods of building or of finishing buildings which almost inevitably succumb to rapid decay, and become rickety and unsightly. Now, all these drawbacks to the healthiness and cheerfulness of a crowded town district we encourage and foster by certain methods of building which have become traditional, and are carried on without thought and as a matter of course, and as if they were inevitable conditions of building. This applies almost as much to the houses of the better class in the superior districts of towns, as in the inferior; only the evil is more felt in the latter. It is difficult enough under the most favourable conditions to keep crowded districts of a lower class healthy and cheerful; but it becomes more so when the buildings themselves are so constructed as to have a natural tendency to harbour what is unhealthy, and to appear (and to be too often in reality) rickety and falling to pieces.

To exemplify more particularly what we mean, we will draw attention in the first instance to the manner of finishing shop-fronts which prevails both in the better and inferior districts of our towns. By common consent, and merely because it is the fashion, almost every shop has constructed before and around the front of its ground-story a joiner's erection of perishable shallow cornices and pilasters of wood, which when made gaudy with paint may pass off very well before the uncritical eye of the general spectator, but which is really a mass of utterly useless gimcrack hung on to the building, an excrescence at the very best. In the inferior districts of a town, the frequent re-painting and garnishing of these pieces of cradling cannot be carried on to the same extent as in the superior districts, so that even their value in making a gaudy show is lost. Their effect from an architectural point of view is mean and confused; but this mass of gimcrack shop-fronts must surely have a bad effect in a sanitary sense also. Instead of solid walls, which even if not artificially cleaned, are washed by the rain without any harm to their structure, we have a mass of woodwork with hollow spaces behind, wherein dirt and vermin may lodge unseen and undisturbed, where decay may go on unperceived, and which are not susceptible of outward cleansing except by the application of fresh coats of paint. Surely it would be an advance in the favourable conditions for sanitation of a crowded town neighbourhood, if we did away with all this gimcrack, and insisted on the building of honest brick walls and arches, or stone or iron lintels, showing a plain sound construction, with "no deception," and getting rid of a mass of unmeaning stuff which must come to pieces sooner or later, and which renders the cleaning of the front of the building twice as difficult and ineffectual as it might otherwise be.

When we come to the interior of the house where sanitary considerations more directly, concern the inmates, we find various forms of unpermanent and uncleansable material and construction have established themselves as a matter of prescriptive right. We have a quantity of really unnecessary joiners' work put together, with hollow spaces for the accumulation of dirt and rottenness, in the pulley casings which are matters of course in English window-hanging. Far more solid and sound construction is the casement-window, with its solid frame, leaving nothing behind and out of sight, no hollows to fill up, no hidden wooden boxes that no one can get at. People imagine that casement windows are not as weather-tight as the sash-windows, a mere prejudice resulting from bad making of the former more than anything else; and it is quite certain that in buildings where work has to be done cheap a casement-window is more likely to be accurately fitted in the walls, and less likely to admit damp and draughts between the wall and the frame, than a sash-window, with all its band-

box apparatus of casing, which can only be really well and solidly made and kept up at much greater expense than can usually be bestowed upon it in houses of an inferior class.

A great part of the interior finish of an ordinary room is composed of perishable, frail, and dirt-holding materials. The ordinary wainscot, which pretends to be a plinth, is a kind of wooden shell fastened in front of the wall, the space behind which forms a parade-ground for mice when they get into a house, which they constantly do when they find such commodious arrangements made for their privacy and security. A well-executed wainscot, carried full above "chair-back height" round the wall, or a completely wainscoted room, each has a good effect, though it may be doubted whether the latter forms the healthiest lining to a room. When the expense of so costly an adjunct can be gone to, there is a possibility that the work will be solidly put up; but the ordinary house wainscot is a mere piece of joiner's sham, worst of all when, as is often done, there is the silly pretence of a sub-plinth to it, of course, in another separate piece set on. A solid piece of thick wood, with the moulding worked out of it, and fixed close against the wall, would be a very different affair, though one can hardly, even in that case, see the absolute necessity of the addition; but where this cannot be afforded, it would be far better to be content with merely a solid rail of wood, with a concave quarter-circle moulding run in it, so as to connect the lines of the floor and wall by a small curve, which can be easily swept, instead of allowing them to form an angle where dust and dirt will lie in a way difficult to remove. This is assuming the existence of a plastered coating on the wall. It seems a quixotic undertaking to tilt at plaster, which has enjoyed so long a life as the accepted internal coating of walls; and we may be asked what we would propose as a general substitute for it, and may admit that consistently with necessary economy, it is, perhaps, not so easy to say. But it is quite certain that a model wall-finish ought to have one of two qualities: it should be capable of being easily and thoroughly cleansed, or it should be capable of easy renewal. Plaster has neither characteristic. It holds a great deal of dirt, and can hardly be cleaned at all, and it cannot be renewed without much trouble, dirt, and expense, and emptying the house or the apartment for the purpose. For hospitals there is not so great an objection, because in every well-regulated hospital every ward should be empty for a time by rotation, and the plaster could be chipped off and renewed during that period, if medical sanitarians think (and some of them do) that this entire removal of the lining of the ward is the only way to disinfect it thoroughly. But such a proceeding cannot be conveniently undertaken in a private dwelling-house. In a majority of houses the resource is papering, and, artistically speaking, a great deal may be said for papering as a means of producing an agreeable effect in an inexpensive manner, and a great deal of very good decorative art has of late years been applied to the design of wall-papers. But papers, like plaster, come under the denomination of materials which can neither be well cleaned nor easily changed, and which absorb and hold a great deal of unhealthy matter. They are, of course, much more easily renewed than plaster, but the temptation in cheap house property which is not very well looked after to lay one paper over another is very great, and is often indulged; and nothing can well be more deleterious to the healthiness of the room than this; and stripping off and repapering, though much simpler than replastering, cannot be done often enough to ensure a really clean and healthy state of the walls. There appear to be three courses open to us. One is the employment of Parian cement, or some other hard and washable cement, as the interior lining for walls, when nothing is to be placed over the surface. In the poorer class of houses which are not papered, the plaster surface is one of the worst in sanitary condition and even in unsightly appearance, after a certain term of occupation, which could be found. Mere lime-whitening, if the wall is a sound one, is a much better and healthier finish, though certainly not agreeable in aspect, and is easily renewed. Where Parian or other cement is deemed too expensive (although nothing ought to be considered too expensive which concerns the actual healthiness of a habitation), and where lime-wash is considered too rough, coating the plaster with such a preparation as silicate paint, which will bear washing, is a great improvement on papering or on the ordinary paints. In houses of the best class there remains the alternative of building the inner faces of the walls with solid materials of a high class, such as glazed brick or some of the numerous terra-cotta materials which are now offered to the choice of those who build. There is then something perfectly capable of being cleaned, provided always that it must not have surface decoration which is too deeply cut and which would leave hollow places where dirt would collect and which would be difficult to clean satisfactorily. If such an internal finish be thought too cold for this climate, then there is the resource (we are now speaking of habitations where expense is not a primary consideration) of hangings which can be easily taken down and put up again, changed, cleaned, or renewed, which can be removed from the room when not in use and thoroughly aired. There is the question of picture-hanging to be considered, of course, in a majority of houses. Where some material can be strained close to the walls when hung, pictures can be hung over it (as at the Grosvenor Gallery), or a very good effect, combined with warmth and comfort, may be produced by tapestry or other hangings on the lower part of the wall, with the solid interior surface left above a certain level as a background for the pictures. The object which runs through all these suggestions is the same,—to have the walls of our rooms either of such material, if permanent, as can be efficiently cleansed without injuring it, or hung or fitted with such decorative material as can be easily removed and cleansed or replaced as often as the greatest attention to sanitary conditions demands. Now the fact is that nearly all inhabited rooms are at present finished internally in a way which precludes the observance of either of these conditions. With impervious walls, however, let it always be remembered that ventilation must be more especially attended to.

Plaster is an insidious tempter also in the excuse it gives for those foolish and unmeaning ornaments which are called plaster cornices, and which are made worse by being "enriched" with ornaments usually questionable in design, always perishable in material, and almost always contrived so as to hold a quantity of dust, dirt, and soot which is never dislodged. It is not easy to say whether this superstition of the plaster cornice arose in the first instance from the idea that every internal wall must have a plinth at the bottom and a cornice at the top, because the external wall has; or whether the plaster cornice is a kind of reminiscence or suggestion of a corbel to carry the floor above. Whichever be its origin, it is equally unmeaning. There is perhaps no part of the internal economy of our buildings which is more marked by the spirit of the jerry-builder than the junction of walls and floors. A large and pretentious plaster cornice, with its wooden backing or bracketing, is really a process of hanging a quantity of stuff on to the walls at that point, in a form which simulates that of a bracket bearing on the walls and supporting the over-floor. The reasonable and solid way of doing the thing would be to project a corbel, say of terra-cotta, built into the walls, and projecting sufficiently into the room to give a bearing for the floor-joists over; and this would form the finish of the wall-surface and fill up the angle between it and the ceiling.

The ceiling is a question by itself, being as it is under different statical conditions from the wall-surface, and depending even more than that on the principle of construction and the material that may be employed in bridging the space from wall to wall. When wood flooring is employed, the simplest way, no doubt, is to leave the joists open, and varnish them and the under-side of the flooring-boards, which, in such case, should be thicker than usually employed, and, of course, grooved and tongued. But this is bad in the way of light, and, moreover, does not sufficiently damp sound between the room above and the room below. What is quite certain is, that to underdraw the joists with lathing and plaster is one of the worst methods that can be employed. The plaster reflects light, it is true, but it also collects and renders peculiarly visible all dust from occupation of the room and soot from combustion; it cannot be cleaned except by the process of rewhitening it, which means shutting up the room for some days, and the plaster is a material peculiarly liable to crack under the shaking of the joists from traffic in the room above. We have before now drawn attention to and explained the small phenomenon which most people have noticed, especially in small rooms where much gas and coal is burned in proportion to the area of the room, of the lines of the joists showing on the plaster ceiling in lines rather whiter than the rest of the plaster. The appearance results from the fact that in interspaces between the joists, the porous plaster receives and retains a great amount of soot and dust, which seems to work its way right into the plaster, but which does so less readily where the plaster has the solid backing of the joist immediately over it. The shaking of the plaster may no doubt be obviated by placing it on separate ceiling joists, but what an amount of perishable material and what holiday spaces for vermin this involves. A wood ceiling is, of course, much superior, but rather dark, and decidedly costly if well done. A well-known firm of decorators have patented a form of enamelled iron-ceiling material which offers some advantages, and can be affixed to wooden joists. The specimens we have observed have been tawdry in design, but this need not be so, and the material appears capable of such treatment as to reflect as much light as a plaster ceiling, and to be capable of ready cleansing. But it is a matter for serious consideration whether some of the various methods of solid floors of iron and concrete, or other materials, should not be far more used than they are, even in ordinary dwelling-houses. They possess the immense advantages of solid construction,—no internal hollows and dark recesses; they are more sound-proof and more safe against fire than timber floors, and they are capable of being finished as ceilings in a way perfectly capable of cleansing as often as is thought desirable. In the case of rooms of the better class, a very good effect might be got by dividing a concrete and cemented ceiling into low domical sections. In houses of the poorer class, and with smaller rooms, concrete floors can be so easily and cheaply applied, even without any iron in the case of small rooms, and are so much more conducive to good sanitary conditions and constant cleansing, that they seem to be the most natural method for use in this class of property. There is an objection to concrete floors on account of want of warmth and of the elasticity of a wooden floor. In the case of poor houses in crowded districts, however, the sanitary advantages of a washable floor (if utilised) greatly overbalance these drawbacks: in the case of houses of a superior class wood flooring-boards can be laid down on bearers over the concrete floor, and in that case could be laid so as to be easily removable for thorough cleansing of the structure, so as not to leave any long accumulation of decaying matter between the boards and the cement floor.

The "box" marble chimney-piece is not so directly connected with unsanitary results, though it is apt to leave pernicious spaces and hollows in its rear; and it may certainly be said that there is an unhealthy effect produced on the mind by the mere sight of things constructed in a rickety manner, and so as to be bound to come to pieces sooner or later. In a similar way the wooden cornices for carrying gutters, or pieces of joiner's cradling hung on to the wall, contribute to give a disagreeable impression of rickety building, and are indirectly injurious in putting in an exposed situation a piece of questionable construction in a perishable material. Gutters should be carried on or made of a solid material.

The unsanitary results of insecure foundations, and walls without sufficient bond in construction or solidity and mass of material, are too well known and too generally admitted (in theory) to need fresh demonstration here. We have wished rather to point out that some methods of building in the detail and finishing of houses, which are almost universally used, are not only somewhat mean in effect and perishable in quality, but that they have, directly or indirectly, a prejudicial effect on the sanitary character of habitations, especially in a crowded district. In the country this part of the question may be less important. In towns it seems certain that the more solidly and durably houses are built and finished, the more capable they are of continual cleansing without damage to the materials or serious inconvenience to the inmates, the more nearly do they approach to the best sanitary conditions of town building (other sanitary provisions being equally attended to); and that very few ordinary town dwellings are at present built without incorporating in their structure, in a most prominent and often

wholesale manner, a great amount of perishable, unwashable, and dirt-holding material. We say therefore emphatically, give us the most solid building and the most solid durable form of internal finish that can be had, even at the expense of being very plain and losing some cheap form of pretty decoration. The real ends of building will be best answered so.

One important *caveat* must not, however, be passed over. It must be remembered that in proportion as houses are solidly and imperviously built, in that proportion must all provisions for ventilation, both for inlet and outlet, be the more complete and systematic. Pervious walls and floors let in and retain things which they ought not, no doubt; but they also serve to let in air, for the ingress of which there is often no other provision, and which must be had. It is one virtue of solid construction that it also almost inevitably leads to and demands scientific construction.

A GLANCE AT OLD DUMBARTON.

No tourist who has sailed down the river Clyde on board the swift *Iona* or *Lord of the Isles* has failed to make special note of the rock of Dumbarton, rising 240 ft. high, with its double peak and the scanty remains of its battlements that from times far remote kept grim watch over the mountains and the valleys of the Lennox. Of this Castle of Dumbarton, the guide-books have little to tell beyond the information supplied by that venerable tourist, Pennant. It is described by Buchanan as an *arx inexpugnabilis*, and must have been impregnable to the ancient manner of besieging. Its name was Dun Briton, and it was also called Arcluith or Alcluith. Wallace was confined here. In A.D. 756 its garrison capitulated through famine; in 1571 it was taken by escalade; and in 1639 it was "surprised" by the Covenanting party. The castle at this time was held by Sir William Stewart on behalf of the king. On the last Sunday in March, Governor Stewart, with his family, attended the parish church, unaware that the enemy had fixed upon that day for the carrying out of a scheme to take possession of the fortress. After service Provost Sempill, a zealous Covenanter, invited Stewart to dine at his house. On Stewart declining the invitation he was surrounded by a troop of forty men, conveyed to the provost's house, and forced to give up the keys of the castle. "Stewart," says Spalding, in his "History of the Troubles in Scotland and England," was compelled to cast off his clothes, "which were shortly put upon another gentleman of his shape and quantitie, and he putt on his cloathes upon him againe. Thus, apparel interchanged, they commanded the captain, under paine of death, to tell the watchword, which, for fear of his life, he truly told. Then they go in the night quietly, unseen by the castellans, and had their counterfeit captain with them, who cryed and called by the watchword, which, being heard, yeitts (the gates) are cast open, in goes the Covenanters with greater power than was within to defend it, and mans and fortifies the castle to their mind." A two-handed sword, said to have belonged to Sir William Wallace, is exhibited in the old armoury. Here does not end the romance of the castle; but we cannot pursue it.

"Dumbarton is a small but good old town seated on a plain near the conflux of the Leven with the Firth of Clyde. It consists principally of one large street in the form of a crescent. On one side is the Tolbooth, and at the south end the church, with a small spire steeple: it had been collegiate, and was founded (1450) by Isabel, Duchess of Lennox and Countess of Albany." This is all that Pennant had to say about the town in 1771, and Robert Chambers, in 1827, has still less to say: "It is a small town undistinguished by commerce, and possessing no manufactures except glass-making and ship-building." The publication of the "Dumbarton Burgh Records," lately given to the public, is especially valuable for the light these Records throw on the daily life of the townspeople in the seventeenth and early part of the eighteenth centuries. Here are a few extracts. The words are slightly modernised:—"June 22, 1627. The which day they ordained the bailies to cause the glasswright make up a new glass to the Tolbooth in the lowest window, seeing that the old window is all broken. Also, that the roof of the Tolbooth and the cross be painted and dressed. Also, in regard the painter is in this town, painting Sir William Alexander's ship, they think it meet to cause him to renew the painting and colouring of the orlage (the town clock), *if the bailies can agree with him cheaply on the town's charges.*" We hear of this travelling artist on the 27th of June, 1628: "They ordaine the magistrates to agree with the paynter and cause coulor the stake of the cross after it has been oiled." In 1660 the magistrates employ another painter: "James McArthur, the Treasurer, is ordained to pay Gay Littlejohne, painter, the sum of 20 merks, and that in full payment to him for colouring of the council seat and of the horologe; and because the said Gay Littlejohn is owing certain sums to Elizabeth Stirling, ordains the Treasurer to pay the said Elizabeth." This "horologe" was a frequent annoyance to the magistrates. The last heard of it is in 1700, when "Andrew How, of Kilbarchan, undertakes to provide a new pendulum-knock (clock) for the Tolbooth, and paint the dial of the same, for 12*l*." Shortly before 1607, Dumbarton had suffered from an inundation of the Clyde and Leven, and in that year the Scottish Parliament made a grant to the town of 3,700 merks for the raising of bulwarks. In the "Records" these are referred to as "The Water Work." Scarcely a week passes without a visit paid by the magistrates at low or high tide, by night or day, to the "Wattir Wark." Those of the inhabitants who failed to contribute to the expenses of the undertaking were summarily dealt with. "July 20, 1629. The which day it is concluded that the whole persons owing money belonging to the wattir wark be chargit in ward [imprisoned] within the Tolbooth, therein till they pay the same." The Tolbooth, or townhall and prison combined, is in a chronic state of disrepair. The roof of the council-chamber lets in snow and rain, and prisoners are constantly escaping. To remedy the latter evil two blacksmiths are employed by the magistrates to "make a pair of bogies of a great gad of iron and six iron schikills [shackles] to run thereupon for keeping malefactors in regard of the weakness of the Tolbooth."* Among the motley prisoners were many accused of witchcraft: "March 5, 1632. Forasmuch as David Glen has been executioner of the witches that has been execute in this burgh, he is to have a salary of sixteen merks yearly for his thankfull services."

The townsfolk enter with spirit into the building of an hospital. The stones are to be carried to the place of building by boat, and in consequence of the height of the sands, the council "ordains the town to make a trench through the sand, whereby the boat may the better float, and the stones to be carried away in barrows." The townsmen are divided into "three-thirds," each third, in its turn, coming to the work with spades, shovels, and barrows. The Laird of Buchanan presents his "carrying" boat to the town to convey stones for the hospital, on condition that hereafter they maintain a boat, and pay a certain duty out of it to the hospital. The Collegiate Church, already referred to, was in ruins, and its broken walls formed a convenient quarry for municipal building purposes. "April 22, 1628. That the holes in the church vennel [passage or way] be helped and filled up with earth and stones from the colledge [Collegiate Church]," and the magistrates and council appoint a master of the work.

Another of the town improvements is a pier, the construction of which is resolved on in 1632. Nothing more is heard of the pier or "keye" till the last day of June, 1655, when "Robert Glen, who was appointed overseer of the work and building of the common key of this burgh, produced his accompt." The account is interesting, as it shows some of the prices of labour in those days. The wrights or carpenters are rated at 14s. Scots a day, the layers and builders of the stones at 13s. 4d., and the barrowmen at 8s. As all the houses and even the church were thatch-roofed, many precautions had to be taken against fire; the blacksmith,—there was but one,—was bound to use stone and lime in the construction of the wall against which his furnace was placed; and Myrie McFarlane, a servant-maid, who, through her carelessness with lighted candles had set fire to the houses of two of her masters, was banished the town, and the inhabitants were cautioned, under heavy penalties, not to admit her into any of their dwellings.

Just one peep into the "Kirk Session Records," appended to those of the burgh. "1620. For a sand-glass, 13s.; for an iron to set the glass into, 20s." A shilling Scots equalled in value the present bronze penny.

Before leaving Dumbarton mention must be made of Tobias Smollett, who received the rudiments of classical learning at the grammar-school of the town. An interesting letter written by the novelist and historian from Chelsea, March 9th, 1756 (not published in any collection of his works), concludes,—"I have had occasion, lately, to inquire into the antiquities of our country. I find the Scots came from Ireland but yesterday in comparison with the central city of the Caledonians and Britons of Arcluyd (Dumbarton). I would fain derive myself from these last; but whether ancient Scot, Briton, or Norman, I am with equal affection and esteem, yours, &c., Ts. Smollett."

* See in Scott's "Guy Mannering," the incarceration of Dirk Hatterick.

LONDON WATER SUPPLY.

The ancient proverb, "That wisdom may cry abroad in the streets, but men will not regard it," seems to be illustrated very forcibly in the history of the debate as to the water supply of London. The propriety of beginning at the beginning, in any endeavour to interfere with a question of such extraordinary magnitude, is for the most part steadily ignored. It was ignored by Sir W. Harcourt's Committee. It was ignored by the meeting of the delegates from various vestries and district boards which was held on the 20th inst. in St. Martin's Vestry-hall. We are very glad to see such a meeting convened to discuss such a subject; but we should have been more content if any of the speakers had put before the assembly the really salient and controlling points of the question.

In the state of jumble in which the matter is now left, it is almost safe to predict that no real reform can be effected. The questions of the rights of the public, the rights of the companies, the quality of the existing supply, and the machinery of a new authority, are all hopelessly tangled together; any remark that any speaker makes on one head usually calling forth some irrelevant remark from some one else upon another.

Coming to business: at the meeting we have named, Mr. Beal moved that the Home Secretary should be asked if the Government intended to give notice of a Bill for the constitution of a water authority,—a Bill limited to such object. Of course there can be no objection to the putting of such a question, though it is a somewhat feeble issue of a public meeting. Mr. Berry, in seconding the motion, referred to the views of Dr. Frankland as to Thames water, and said that it was a question for them to consider whether they should not petition in favour of an independent source of supply altogether. Mr. Morton supported the motion, and was in favour of a competing supply. Mr. Reed was in favour of the principle of the motion, but thought the question should not be encumbered by entering into details. Mr. Potts thought that the different vestries should be consulted, and was of opinion that the people of London would stand appalled at the idea of having the streets torn up and household affairs completely disarranged in order to establish a fresh water-supply. Mr. Redall appealed to the experience of those who had been drinking London water for many years, and were there still, in proof of the opinion that the water was not so bad as was stated. The motion having been carried, Mr. Beal was for proceeding at a bound to ask the Home Secretary "to arrange, between this and the meeting of Parliament, for a valuation of the works and plant of the companies; for a completion of the audit to the 31st of December of the accounts of all the companies; and for a report on the present condition of their works, and on the outlay requisite for their transfer in perfect order." It did not seem to occur to the speaker that his plan could not be carried out without the full consent of the companies, except by virtue of some future legislation. Mr. Berry very justly protested against the motion as premature, and as invading the functions of the wished-for water authority. Mr. Potts hoped that the time was not distant when there would be a municipality for all London; and the delegates adjourned to the 3rd of November.

As advocates of the need of water reform, long before the subject became a fashionable topic, we wish to say one or two earnest words to those who really, and with single aim, desire satisfactory amendment to be effected. First of all, London is the master of the situation, if

London only makes up its own mind. London has not to come as a suppliant to Parliament. The existing companies, sooner or later, all must do this. They must come to Parliament for increased power, and most of them must do so shortly. If London, then, has made up its mind, it can dictate its own terms, or it can raise such an opposition as no company can hope to overcome. The position of the metropolis as a petitioner for a Bill is one thing; its position as the opponent to petitions for Bills to which the great body of the inhabitants are opposed is another. The first position is questionable, the latter is almost unassailable.

Secondly, no new legislation can be anything but tentative, and probably both costly and mischievous, that is effected before the physical problem of the sources of supply is satisfactorily solved. We find that the most opposite views are enunciated on this subject, but the pages are few and far between in which will be found any reference to the real difficulties of the matter. It is not a subject to be dealt with on the hand-to-mouth principle. The water-supply of London in the year 1892 seems to be the utmost range as to which any one has permitted himself even to think. What is to be the source of the supply in 1980? What even in 1930 A.D.? It would be worse than childish to spend millions upon millions without looking forward to the wants of at least another half-century. Yet we have one set of critics gaily cantering on one hobby, and another set on another, just as if the source of the water supply were a matter as to which we had any great choice. One person would not use Thames water on any account; another would only seek supplies from the chalk; a third would avoid the chalk-water as laden with mineral matter, and the hardest of all supplies; another would tap the lakes of Wales, of Westmoreland, or of Cumberland.

But the ugly fact remains that the whole water supply of the Thames valley, or water-shed area, as measured by the outflow of the river, will not very long serve the need of London, unless we invent some method of utilising what now runs to waste. And as to bringing a supply, at the cost of tens of millions of money, for hundreds of miles, the objections are so grave that they may well be regarded as conclusive.

What is needed, then, for the real improvement of the water service of London, is, in the first instance, a thorough settlement of the question of the available sources of the future supply. Until this is made plain, nothing but squabbles can result from attempts at premature legislation. With that question once solved, the details of the settlement with the existing companies will be matter of comparative ease, if we always bear in mind,—although Sir W. Harcourt's Committee omitted to find it out,—that it is the companies that will have to come forward as petitioners, and not the metropolis. London, we repeat, is the master of the situation, when London knows its own mind. And the first facts which London requires to have made plain, in order to come to a wise decision, are the physical facts of the hydrometric supply of water. A businesslike technical inquiry into this controlling part of the subject is the first object at which every honest and intelligent champion of water reform must persistently aim.

OPEN COMPETITION FOR A MONUMENT IN ROME.

In pursuance of a law passed in July last, Signor Cairoli, the president of the Royal Commission appointed for the erection of a monument in Rome to the memory of King Victor Emmanuel, has issued a programme inviting the competition of artists, whether native or foreign, without any distinction. This document declares:—

1. That a competition is opened for designs for an honorary monument to the memory of Victor Emanuel II., liberator of the country, founder of its unity.

2. All artists may compete.

3. No limit is fixed to the invention of the competitors, either with reference to the conception, the style, or the choice of site.

4. The cost of the monument must not exceed 360,000*l*.

5. The "*disegni modelli*" must be so executed as to show clearly the idea of the author. (We leave the words untranslated, in the conviction that it will be important for any artist in the United Kingdom or United States who intends to compete to ascertain directly from the Secretary of the Commission whether that condition will be held to be fulfilled by the preparation of drawings alone, or whether what we usually understand by the word "modelli" will be requisite.)

6. The competing designs may either be signed by the artist, or marked with a motto, which is also to be written on the outside of a sealed letter, containing the artist's name. Only the letters of the authors of the prize designs will be opened.

7. According to the terms of the law of the 23rd of July, 1880, the close of the competition will be the 23rd of September, 1881.

8. The designs must be sent to the Secretary of the Royal Commission, at the Ministry of the Interior, not before the 25th of August, 1881. All the designs, except those obtaining prizes, are to be withdrawn within two months from the publication of the decision.

9. Before the decision, the works are to be exposed to public view. The decision will be published in a report in the official *Gazette* of the kingdom.

10. Three premiums, one of 2,000*l*., one of 1,200*l*., and one of 800*l*., will be adjudged to the three first designs in order of merit. Not less than ten favourable votes will be necessary for each adjudication. The drawings will become the property of the State.

11. The adjudgment of the premium will not bind the State to employ the artist to execute the work.

12. The members of the Commission were named by Royal decree on the 13th of September. They comprise four engineers, two sculptors, one painter, five senators, and four deputies, under the official presidence of the President of the Council of Ministers. The secretary is Signor de Renzis.

As eye-witness to the great peril produced by the Revolutionary movement in South Italy, from which the reluctant intervention of King Victor Emanuel delivered the country, we hail with pleasure this attempt to raise a noble monument to his memory in Rome. For an international competition the terms are well judged. The only question is as to the justice of Article 11, but it must be remembered that a foreign artist might have great difficulty in personally superintending the erection of a great architectural work in Italy. The provision that the designs shall be exhibited before the prizes are adjudged is to be praised, as the public voice will then be heard before it is too late. We beg to offer the committee a motto for the monument:—

"Olim dirept'â Tarquini fronte coronâ
Patria facta a te cingit tua tempora, Victor."

PUBLIC HONOURS TO DAVID D'ANGERS.

The appreciation of artistic genius has overcome the prejudices of party feeling in the land where the Vendéans held out for so long against the Republican forces. The town of Angers has been the scene of a grand demonstration, of public rejoicings, illuminations, and torch-light processions, to celebrate the unveiling of a statue in honour of the sculptor David. The Minister of Foreign Affairs, M. Barthélemy de Sainte Hilaire, and the Under Secretary of State for the Fine Arts Department, were the principal speakers on this occasion, and they both rendered full homage, not merely to the memory of David, but to the success of M. Louis Noël, the artist who conceived and executed the statue which has just been unveiled. The memories this ceremony have recalled are interesting and pregnant with encouragement and a good moral. David d'Angers, like most great artists, had to struggle against adversity during his earlier days, and his efforts were much impeded by the wars that distracted the country at the time. Following his father on the battle-fields, he fought for the Republican cause, and the memory of these experiences furnished him with the subject matter of some of his best works. His father was one of the 5,000 prisoners who were kept in the Church of St. Florent, and would have been executed, but for the dying request of the Vendéan leader, Bouchamp. The politic and humane action which Bouchamp enforced with his dying breath saved the life of David's father, and the son, throwing political animosity aside, carved with his own hands a splendid monument in memory of the Vendéan chief. It was in 1825 that this monument was inaugurated, and the sketches which David took on that occasion are among the most interesting objects exhibited in the Musée David. The old Vendéans came in great numbers to pay homage to the statue of their great chief, and brought with them the guns they had so often levelled against the Republicans. The groups formed by these armed veterans standing round the statue were not only sketched by David, but under each portrait he wrote a few biographical notes. The following is one of David's notes, and it will give some idea of the times and the subject:—

"Louis Châtigner, of Bouchamp's army. After the rout at Le Mans, he was captured with his brother, and both were shot. His brother died instantly, and he fell struck by a bullet that passed through his cheeks. Feigning death, he remained motionless on the ground for several hours, and at night took flight, escaping through the woods."

David d'Angers knew how to respect all great men of whatever party they might be, while remaining himself a fervent Republican. Among his most celebrated works are his statues of Condé, Corneille, Cuvier, Bichat, La Fayette, Goethe, Guttenburg, and Barra. His life was one long devotion to the perpetuation of the features, history, and memory of great men,—of men who rendered notable services to their fellows. Animated with this great idea, he made the cold marble look as if it breathed, and left behind him heart-stirring examples of his genius in immortalising the genius of others. It is satisfactory to find that at present his artistic capacity and work, and not his political views, are uppermost in the public thought, and that all parties are ready to do honour to his memory.

THE LATEST AMERICAN WONDER.

The operation which is necessary for cutting a round or octagon bar of steel into short lengths, such as those that are required for masons' chisels, has never been very elaborate; but a new invention is said to have made its appearance in America which will simplify the process still further. The method that has hitherto prevailed has been to place the bar on an anvil, and after having given it a nick by the blow of a sledge-hammer falling on a sharp chisel in contact with the steel, little difficulty is found in knocking off a length by another stroke. The molecular change that takes place in the neighbourhood of the incision produced by the hammer and chisel is the immediate cause of the bar being so weakened as to admit of its being readily broken, and this alteration in the physical constitution of the steel can be readily recognised by the microscope. Instead of the molecules of the metal lying in the direction of the length of the bar, they are turned about under the sudden pressure of the chisel, and present the same appearance as the section of a bar that has been violently snapped asunder. But interesting as this phenomenon is to the initiated, it is far surpassed by the new invention that is said to be in use in America.

Now-a-days, unless statements are made that are in evident antagonism to known facts, it is often the wisest course to reserve one's judgment. Radiometers and vortex rings, telephones, microphones, and phonographs, were all capable of being romanced about in the earlier stages of their development in such a way that the greatest expert in applied science who happened to have heard of them for the first time, might well have been pardoned if he had regarded them with blank incredulity. Since, however, they have all asserted themselves as facts and not fictions, and have, at the same time, opened up an aspect of natural law that had hardly been suspected and is still little understood, one must listen to the story of further discoveries with reserve. The new American machine includes the apparently inconceivable anomaly of a highly elastic fluid cutting through a solid by reducing it to molten drops that do not burn. Nothing could be more simple than the arrangement of the parts of the apparatus which is said to work such wonders, and indeed it is so simple that any one on this side of the Atlantic who is anxious to test the veracity of the narrative can do so with very little outlay. It consists of a thin disc of soft iron revolving at a high velocity, placed very near to a bar of steel turning in the same direction, at a lower speed, but not touching the disc. When the bar and the disc are revolving, the side of each is, of course, moving in an opposite direction to the other, and it is alleged that when a properly-proportioned

speed is maintained, the steel begins to melt and drop away, so as to allow of the soft iron disc being moved forward till nothing is left but a narrow neck of steel at the very centre of the bar. This phenomenon of itself must be sufficiently extraordinary and altogether out of the range of our previous experience, but what follows in the heatlessness of the molten steel, if the absence of any sensation of heat is to be taken as a test, is still more startling. Along with an account of the apparatus itself, an attempt at explanation has already reached this country, but whether it is the real one or not it is impossible for us to say. Certainly, if it be once demonstrated that the bar of steel is melted, then it follows that even in the face of this phenomenon there can be little or no exhibition of what we have hitherto known as sensible heat, or else how could the soft iron disc remain unaffected by it? Meantime we can hardly expect ginger any longer "to be hot in the mouth" if molten steel has ceased to convey the impression of heat. If the story is true, it must necessarily lead to some new and very important departure in the study of molecular phenomena. If the machine is only available for cutting small steel bars, then it is quite in the way of many of our readers who are large users of chisels. If they think the extent of their business would justify them in using machinery for cutting steel bars into lengths, they could hardly have a simpler appliance than a thin revolving disc of soft iron. The revolution of the steel bar, which is said to be a necessary condition of success, adds slightly to the complication of the machine, but not so much as to tax very severely the ingenuity of a skilled mechanic. Perhaps, however, it would be wiser, without alleging that the story is a hoax, to wait until we hear something more of its performances, or until a specimen that has done what has been ascribed to it has been actually imported and proved in England.

WOOD-PAVING: ROAD-CLEANSING.

There are several examples of wood paving in London. Some of these may be seen in Pall-mall, at the top of St. James's-street, along parts of Piccadilly, at Knightsbridge, and on to the South Kensington Museum; Sloane-street and King's-road, Chelsea; along the Strand, Oxford-street, and other streets. Most of the wooden blocks are creosoted; some, however, are not. The *Builder* (I assume) has no desire to puff one form of paving over another, but it may be allowable to indicate the samples which appear to wear best and look best in wear. The wooden blocks laid on sand and boards, with wide joints filled in with gravel-concrete, have not lasted, and were never smooth to travel over, whilst the wooden blocks laid on concrete, and bedded and jointed with felt (the blocks laid close) present an even, smooth surface; apparently water-tight, and very easy to those who drive over this pavement. London can well afford to pay any moderate extra cost for a sound, safe, smooth, and noiseless road, which shall have a minimum of mud in wet weather, and of dust in dry weather. If the cheapest road is not also the soundest and safest, it is not even cheap in the end. The traffic of London is so enormous, and clean, noiseless streets have so much to recommend their use, that any moderate difference in cost is not of much consequence; that is, from 15s. to 20s. per square yard, and the "fad" of having a covering of asphalte over the concrete, and felt over the thin coating of asphalte, and also close-jointing with felt, might bring the cost up to one pound per square yard. It may seem to be an absurdity to say that soft wood forming an elastic pavement will wear longer under a quick traffic than a road similar in all other respects, only that the wood shall be harder, and shall be laid hard down upon a rigid foundation; but experience will give proof in favour of the softer wood, bedded on an elastic cushion, as the strokes of the wheels in quick motion will be expended in the elastic wood and elastic cushion; and the springing or jumping of the wheels will be less on the one than on the other. The best granite sets, bedded on concrete, and jointed with Portland cement grout, will no doubt make a sound, long-wearing, and clean street-surface, but will be jarring to vehicles, and noisy to the residents and public. It is, therefore, evident that length of endurance will not give granite paving the first preference. Asphalte being semi-vitreous, answers admirably on level streets, but is slippery, and therefore dangerous, with the least greasy mud. Horses may fall on wood, but if they do, comparatively little injury is a consequence.

Asphalte, granite, limestone, and wood may be made dangerously slippery by mud on level ground, and any one of these forms of pavement will be slippery on steep gradients; but horses falling on wood will do themselves least injury. There will be no broken knees, as on macadam; so that in this respect wood will be the best pavement.

The Corporation of Norwich, some five years ago, allowed one of the companies to lay down wood paving, at a cost of 12s. per square yard, including a concrete foundation. The local surveyor is now going to accept the old street bottoms, and lay down upon them, as a foundation, wood at a cost of 7s. the square yard, saving 5s. per yard; 62,687 square yards of wood are to be so laid, at a cost of 21,940*l*. The life is estimated to be twelve years.

Wood pavements are said to have been tried in America, and to have been abandoned, as they absorbed moisture, and became rotten, foul, and pestiferous. These are the assertions; but we do not know all the facts. Will not some American reader of the *Builder* supply these, and so enlighten and oblige the residents in the old country?

For good or for evil, London and many other places in England are in for wood pavements in streets of great traffic. We sincerely trust the evils reported of American wood pavements will not develop here.

Road Cleansing.

It needs no elaborate argument to prove that clean foot-walks and clean streets would be a great comfort, especially if they could be secured all the year round. For foot-walk and street washing, labour, implements, and water will be required. The labour and implements should, however, be parts of the regular scavenging staff. The water must be obtained from one or another of the existing water companies who have water to sell, so as to secure a dividend-paying profit. This contingent cost is, no doubt, the main cause why the footways and streets of London never are washed so as to be clean, excepting by a thunder-shower; and it is thunder-shower washing which ought to teach the lesson this article is intended to inculcate. The volume of water falling in rain may easily be imitated by hose and jet, which will wash as clean as the thunder-shower does, and do no more injury by splashing. The cost of the water is, however, at present, the bar in London, as will easily be seen when the price is taken into account. The companies do not all charge at the same rate per 1,000 gallons for sanitary and trade purposes, as this ranges from 4d. to 1s. per 1,000 gallons, the lowest price being prohibitive for street-washing. The actual cost of pumping 1,000 gallons of water does not cost ½d., and if the works were in the hands of a municipality or Government Water Trust, the actual working cost of pumping would be all that need be looked to. Where water gravitates, as at Dublin, Glasgow, Manchester, and other places, and occasionally flows to waste over the bye-washes, such water might just as well be used in foot-walk and street washing as not, the only cost being that of the labour. The misery of dirty, greasy foot-walks and streets in difficulty of walking is great, whilst the cleanliness of a well-washed and clean foot-walk is a comfort.

Many of the leading streets of London will soon have wooden paved surfaces, and here slipperiness may be easily removed by washing. Foot-walks are now formed of asphalte, York paving, or concrete, and any one of these surfaces may be easily washed, and ought to be washed by hose and jet, the washing being done from six to eight o'clock in the morning. Hydrants, upon which to fix the hose, should not be more than sixty yards apart. Reels for the hose, on wheels, are used for fire-service, and for street watering and washing in Paris, Vienna, and other Continental cities. There is, therefore, no reason why hose on wheels should not be used in London.

To wash an area equal to one square acre of surface as effectively as a heavy thunder-shower does might require about 300,000 gallons of water, which, at ½d. per 1,000 gallons, would give a cost of about 12s. 6d. This will be equivalent to nearly one mile of foot-walk, 9 ft. in width. The wages of three men, say, equal to one day for one man at 5s. per day, will bring the cost up to 17s. 6d.: let 2s. 6d. represent wear and tear and incidentals, and we have 1*l*. as the cost of washing one mile in length of foot-walk. If, however, no charge is made for the water the cost would be 7s. 6d.

The foot-walks might not require washing more than once a week, or, say, fifty times in the year; so that the cost per annum for labour only to perfectly wash clean one mile of foot-walk would be less than 20*l*., or fifty miles of foot-walk might be perfectly washed about fifty times in each year at a cost in round figures of about 1,000*l*. Think of that, you shopkeepers in the City, the Strand, Regent-street, and other leading thoroughfares.

Wooden surfaces in streets need not be washed in this perfect manner, and their cost would merge in that of scavenging.

These suggestions are made, but with no hope of their being adopted by vestrydom; to bring about such work there must be municipal government and the water must be public property. Then hydrants may be multiplied to serve watering-carts and to enable sewer flushing by properly-arranged flush-tanks being done each day. Foot-walks washed clean once each week, and water be used on the street surfaces to aid the scavengers. Mud would then be cleansed from the surface, and bad smells from the sewers be done away with.

Civil Engineer.

P.S.—At present the notion is that each householder must cleanse the footway in front of his own premises. Consequently, in very bad weather, with muddy streets, the foot-walks are not cleansed. And when heavy falls of snow take place the householder is subjected to heavy black mail, in the shape of hired labour; and where there are blanks and dead-walls, foot-walks go uncleansed. The entire scavenging should, therefore, be by a public department, vestry, or municipality.

THE "LIVADIA" AT SEA: DANGER OF THE ELECTRIC LIGHT.

The first voyage of the *Livadia* has been marked by one of those incidents which show how new inventions often develop new and unexpected dangers. One of the great points urged in favour of the electric light has been its safety. For great libraries, for ships, for coal mines, we are told, absolute security might be obtained by this method, at the same time with brilliant illumination. One element of danger, however, was overlooked. On the 16th current a stoker on board the *Livadia*, who was helping to swing an electric lamp in the stoke-hole, while holding the apparatus in one hand, unawares completed the electric circuit with the other. He was instantly struck dead by the force of the electric current. And, as occurs in cases of men struck by lightning, decomposition of all within the skin almost immediately became evident. The ornate ritual of the Greek Church marked the committal to the deep of the remains of the first victim of marine lighting by electricity.

The vessel is said to have behaved splendidly. But the weather was exceptionally fine. Forty-eight hours were occupied in running 500 miles. If we allow that five or six were lost in the Irish Channel, by slackening or lying to in fog, we still have a speed of but little over eleven knots an hour. To obtain this, we are told that *only* 5,000 horse-power was employed, only six of the boilers working. Referring to what we said in July last (*ante*, p. 70) as to the cost of the propulsion of the *Livadia*, it will be seen that this speed should have been attained by under 3,880 horse-power, instead of 5,000, by a vessel of the displacement of the *Livadia*, but of better lines. As the difference of resistance increases with the cube of the velocity, the advantage of good lines becomes more and more evident the greater the speed. It cannot be doubted that the *Livadia* is a very costly toy, to work as well as to build. We very heartily congratulate the builders, not only on the noble bonus of 40,000*l*. which they are said to have received, but also on having got the vessel safe off their hands, in spite of the diabolical plot with which it is said that it was menaced; although it is not quite certain that the existence of the plot was anything but a pure invention, framed for the purpose of obtaining money for its denunciation.

On Thursday morning, the 21st inst., in the gale, the bow of the *Livadia* struck some floating wreck, and the vessel has had to put into Ferrol for repairs.

OLD LONDON.

During the present week a party of from fifty to sixty members and friends of the British Archæological Association has been engaged in visiting some of the principal architectural antiquities of London, and a very pleasant and profitable time has been spent by the visitors, notwithstanding the unpropitious state of the weather. These visits, as we stated last week, were arranged chiefly for the behoof of a few of the country members of the Association, as suggested at Devizes, but were participated in by some of the town members.

Assembling on Monday, at 11.30 a.m., in the Chapter-house of Westminster Abbey, the visitors were met by Mr. J. T. Micklethwaite, F.S.A., who, acting as *cicerone*, first gave a brief historical sketch of the abbey, and then proceeded to conduct the party over the church and its precincts. He commended, as very accurate, the restoration of the Chapter-house by Sir Gilbert Scott, for although a great deal of the work was new, there was was authority for it all, with the exception, perhaps, of the figures in the circle over the door inside. As the company passed out of the Chapter-house, Mr. Micklethwaite called attention to the collection of old capitals on the left-hand side, some of which formed part of Rufus's work in Westminster Hall. The others were contemporary, and belonged to the Early Norman cloister which was built after the Confessor's sanctuary was finished. Many years ago, in pulling down an old house north of the Abbey, another of the last-named series of capitals was found. It was engraved in Brayley's "History of the Houses of Parliament," but Mr. Micklethwaite would be glad to know of its present whereabouts. Conducting the visitors round the cloisters, he pointed out to them the positions of the monks' book-cases, the benches on which the Maunday men sat while having their feet washed by the monks, and, in the portion set apart for the novices, a series of indentations in the benches which must have been made, he said, by the novices themselves in idle moments for the purpose of indulging in a game similar to, if not identical with, that now known as "Go-bang." In the south walk of the cloister two or three early effigies were pointed out. Taking the visitors into the substructure of the dormitory, Mr. Micklethwaite observed that this was about the oldest part of the monastic buildings that now remained. The voussoirs of the arches were, to a great extent, of tufa. This work was not of the Confessor's time, but immediately subsequent to it. Proceeding to the cloister of the infirmary, the visitors were allowed, by the kindness of Canon Duckworth, to pass through his residence, and to descend to a cellar which originally formed part of the prison, and in which is to be seen a fine Early Norman arch in good condition, backed by a wall which Mr. Micklethwaite thought might possibly be of the Confessor's time. Mr. Loftus Brock, F.S.A., however, thought that the wall had been erected subsequently to the arch. Through this cellar passes the Northern Low Level sewer of the Metropolitan main drainage system, the crown of its arch rising through the floor. The remains of the Infirmary Chapel, dating from the twelfth century, were next inspected. This chapel took the form almost of a parish church, having an aisle on each side and a small chancel. The columns of the arcade had the peculiarity of presenting the angle of the octagon to the front instead of the flat face. In this chapel took place a severe pugilistic encounter between the Archbishops of Canterbury and York. It was on record that at a synod held here, the Archbishop of York arrived first and assumed the seat of honour. On the arrival of his Grace of Canterbury, Roger of York was requested by the primate to vacate the seat. His Grace of Ebor refusing to do so, he was literally sat upon by his Grace of Canterbury, and this led to a severe fight, in the course of which the combatants severely "punished" each other. Entering the abbey, the visitors next inspected the choir, the shrine of the Confessor, and Henry VII.'s Chapel, where Mr. Brock took occasion to remark that what was supposed to be a representation of the abbey in Saxon times was shown on the Bayeux tapestry. The church there represented had a central tower arranged not at all in accordance with generally-received notions of Anglo-Norman work, and it had long been suspected that this was a "make-up" on the part of the artist. There had been found of late years, however, so much that was in accordance with what was shown on the tapestry that there could be no doubt that the latter did in a rough way indicate the character of the building, and concurrent testimony in favour of the probability that the tapestry did really represent the building was found in the curious fact that a portion of the figure-head of the Viking ship recently found was precisely the same as a feature which occurred over the ends of the Confessor's church as shown in the tapestry. Having thanked Mr. Micklethwaite for his pleasantly-rendered services,

The visitors next paid a flying visit to the recently-restored Church of St. Margaret, Westminster, where Mr. Lambert said a few words about the curious history of the east window. The general opinion seemed to be that the fine interior of this Perpendicular church had gained very much by restoration.

Westminster Hall and the Crypt of St. Stephen's Chapel were next visited and inspected. Mr. Brock expressed his regret that the superstructure of the latter had not been restored after the fire, as, in the opinion of many archæologists, it could have been. However, it was a great satisfaction to have preserved the beautiful crypt, so well restored by the late Edward Barry, but it was to be regretted that it was now disused.

After luncheon, the visitors crossed Westminster Bridge and proceeded viâ the Albert Embankment to Lambeth Palace, where they were received by Mr. S. W. Kershaw, M.A., the librarian, who said he was commissioned by the Archbishop of Canterbury to express his Grace's regrets at not being able to be present to receive the company. Mr. Kershaw first gave a brief outline of the history and character of the library, now, as most of our readers will know, occupying Archbishop Juxon's hall, called after him from the fact that he restored it, the present roof being a copy of the earlier one. The library largely consists of works on divinity, the canon and civil law, histories, and rare pamphlets, but its strength and importance lie in the records and MSS. of the see of Canterbury. There is also a very fine collection of illuminated MSS., the gem of the collection being, perhaps, a ninth-century Celtic one known as the Gospels of Mac Durnan, somewhat of the same character, but smaller than, the famous Book of Kells, preserved at Trinity College, Dublin. In the guard-room the visitors inspected the portraits of a long line of Archbishops of Canterbury, including those of Laud (by Vandyck), Sheldon (founder of the Sheldonian Theatre at Oxford), Tillotson (by Sir Godfrey Kneller), Cardinal Pole (a copy of the portrait in the Barberini Palace at Rome), Warren (by Holbein), Herring (by Hogarth), Secker (by Sir Joshua Reynolds), Moore (by Romney), Manners-Sutton (by Sir Martin Archer Shee), and Sumner (by Richmond). With regard to the portrait of Archbishop Warren, Mr. Kershaw said it was lent to the Royal Academy for their last winter exhibition, and in a note in the catalogue it was stated that it was a copy. He did not know what foundation there was for that statement. Having visited the chapel (recently restored by Mr. Seddon), the "post-room," Cardinal Morton's gateway, and other features of interest, thanks were accorded to Mr. Kershaw (on the motion of Mr. Lambert, seconded by Mr. Morgan), and

An adjournment was made to the adjoining parish church of St. Mary, Lambeth, where Mr. Brock expressed his great regret that the restoration of the church twenty-five or thirty years ago was not carried out on the old lines, as it might easily have been. As it was, a great deal of modern work had been interpolated. One departure made in this restoration could not be justified at all, in his opinion, in any case of church restoration. He referred to the alteration by the restorer of the style or character of the architecture, which was, so to speak, put back from very late Perpendicular (*circa* 1530) to the flowing Decorated of the middle of the fourteenth century now seen. This unwarrantable change of course necessitated the demolition of a great deal of the old work. True it was that when the building came into the hands of the restorer a great deal of the work was structurally unsound, and needed re-building in parts, but that could have been done by taking down the work where necessary, and rebuilding it stone for stone. Fortunately, the tower was unrestored, but with the exception of two beautiful tombs in the chancel, the whole of the body of the church, as it existed prior to its restoration, had been swept away. A word of commendation might, however, be given to the manner in which two brasses had been preserved from destruction by fixing them against the wall. Where a brass had to be removed, from whatever cause, or where it was likely to be worn away by every hob-nailed boot that came in contact with it, no better course could be adopted than that of fixing it to a wall, where it could be seen without being injured. In conclusion, Mr. Brock referred to a few historical incidents connected with the church, reminding his audience that it was in its porch that Mary of Modena, wife of James II., waited with her child for a boat to take her down the river to a ship to enable her to escape from the kingdom at the time of the Great Revolution. Allusion was also made to the pedlar and his dog,—a local tradition, commemorated in one of the windows of the church.

In the evening, several of the members dined together at the Freemasons' Tavern, under the presidency of Lord Nelson.

On Tuesday (a very wet day) the visitors assembled in the Church of St. Saviour, Southwark, where Mr. Brock gave an interesting though brief historical sketch of the church. He referred to the undoubted fact that Southwark, or the "south work," was a fortified place in the time of the Romans, and mentioned in this connexion that in the churchyard, some fifteen or sixteen years ago, a small pavement of Roman tesseræ was dug up by Dr. Druitt, who had evinced great interest in the care of the monuments of the church. After alluding to the legend that the church was founded by a ferryman's daughter in Saxon times, he said that mythical as the story no doubt was, we knew that a Saxon church did exist on the spot, and that church was attached to a nunnery. In about the year 1106 it was refounded for an order of secular canons, with the assistance of William Gifford, bishop of Winchester, who was said in the old chronicles to have rebuilt the body of the church, by "body" the nave being doubtless meant. A few fragments of enriched Norman work, no doubt part of the rebuilding, were found during the demolition of the nave some fifty years ago,—a demolition that was quite gratuitous and greatly to be lamented. Nothing was mentioned in the old chronicles as to the building of the choir and transepts, but they were of later date than the period referred to as the time of the rebuilding of the nave, but yet earlier than 1209, the date mentioned as that of the rebuilding of the church in an old chronicle now in the British Museum. It might, therefore, safely be assumed that the building of the Norman church commenced at the west end. The architecture of the choir clearly showed that it was earlier than 1209 in date, the piers being built more in the Norman manner, having a casing of Caen stone filled in with rubble masonry. A great fire which occurred in 1212, destroying the houses on London Bridge and many buildings in the immediate vicinity of the church, also burnt down the church, the greater part of which seems to have lain in ruins for many years. Next in chronological order came the founding of the chapel of St. Mary Magdalene, which served as the parochial church in monastic times. This part of the fabric was entirely demolished during the restoration of the church about the year 1822. The architecture of the west end, all swept away at the date last named, was somewhat later still. During the time that the rest of the church is said to have been in ruins, the beautiful lady-chapel was erected. This chapel might also, in Mr. Brock's opinion, have served as a retro-choir. Speaking of the tower over the crossing, Mr. Brock said it was to be regretted that the ringing-floor for the ringers of the celebrated peal of bells had been placed so low as to block out the triforium arches above the four great arches of the crossing, for they formed a sort of lantern. Reverting to the lady-chapel, Mr. Brock said it would be impossible to find a more beautiful example of Pointed architecture anywhere. London was remarkable for three beautiful specimens of Early English architecture, and England might be searched from one end to the other without finding more elegant specimens of Early English work. He referred to the Temple Church, the Chapel of Lambeth Palace, and the lady-chapel of St. Saviour's, Southwark (or, as it was anciently called, St. Mary

Overy's). It was a matter of much congratulation that after the vicissitudes of so many centuries this lady-chapel remained in such good and comparatively perfect preservation. It was built about the middle of the first half of the thirteenth century, that is, 1225; its general resemblance to the work at Lambeth Chapel and the Temple Church hinted the probability that they were all three by the same architect. The lady-chapel had been very carefully restored by Gwilt, to whose memory a tablet and a stained-glass window were erected by the inhabitants in acknowledgment of his labours. Having alluded to what was known as the Bishop's Chapel (from the fact that it formerly contained Bishop Andrewes's tomb, now removed into the lady-chapel), which was a projection eastward of the lady-chapel, demolished at the time of making the southern approach to new London Bridge, Mr. Brock recounted some of the many historical associations of the church. The lady-chapel was used as the Bishop's or Consistory Court, and it was here that Bishop Gardner sat in judgment on Bishop Hooper and many other ecclesiastics who subsequently suffered martyrdom. The church contains a number of very interesting tombs; but the gem of them all is that of John Gower, the poet, now removed to the south-west corner of the south transept. Gower contributed largely to the repairs of the church in 1400. Philip Massinger and many other celebrities were buried in the church or churchyard.

A projected visit to the Coal Exchange, for the purpose of inspecting the remains of the Roman villa found beneath that building (in the preservation of which the Association actively interested itself) was abandoned, owing to stress of weather and want of time, and the party, crossing London Bridge, made direct for the Guildhall, and inspected the interesting and finely-preserved crypt, which now, owing to the preparations for Lord Mayor's-day and other festive occasions, presents somewhat the appearance of a temple sacred to Gastronomy.

The Church of St. Bartholomew the Great, West Smithfield, was next visited, and the party was very kindly received by the rector, the Rev. Mr. Abbiss, to whom was accorded by Mr. Brock a well-merited meed of praise for the measures taken by him to preserve and open out to view some of the most important features of the church, notably the very fine circular arcade at the east end, which had been cut off from view by a wall erected in Perpendicular times. Mr. Brock pleasantly recounted the history of the church, which was built by Rahere, and is the oldest remaining church in London. The oldest work is that at the east end, a marked variation in style showing itself westward of the choir, as was pointed out by Mr. Picton and other visitors. Of the nave, which some said extended westward as far as the present entrance-gateway from Smithfield, only a small portion westward of the crossing now remains. A curious feature in the church is Prior Bolton's oriel window on the south side of the choir, containing on a panel his well-known punning rebus, a tun pierced by an arrow,—"the bolt-in-tun." Leaving the church, after thanking the rector,

The visitors next threaded their way north of St. Bartholomew's Church under the curious overhanging wooden houses known as the Long Alley, and crossing Long-lane and passing through Charter-house-square, arrived at the Charterhouse, where they were received by the Rev. H. V. Le Bas, and conducted over the principal portions of the buildings. In the hall Mr. Lambert read an interesting paper on the historical associations of the place, prefaced by a vigorous argument principally deduced from the Scriptures against the system which he called "monkism," and by a brief history of the rise of the Carthusian order, of which the Charterhouse was one of the principal establishments.

St. John's Gate, Clerkenwell, was the next point made for, and here luncheon was partaken of in the great room over the gateway, Mr. Patrick describing the structure, which has now, by the completion of the new street known as Clerkenwell-road, been more fully opened out to public view. The party afterwards visited the well-known crypt beneath what now remains of the Priory Church of St. John. A visit had been arranged to Gray's-inn Chapel and Hall, and hither some few of the visitors found their way, although the visit had to be abandoned by most members of the party. Those who did not miss Gray's-inn spent some time very pleasantly there under the guidance of the Rev. Alexander Taylor, M.A., the chaplain of the Inn, and Mr. Douthwaite, the librarian. There are some good portraits of legal luminaries in the hall, including, of course, Lord Bacon, whose name is so indelibly associated with the history of this Inn, once the leading legal seminary in London.

It was nearly six o'clock, and therefore quite dark, before the members reached the Temple Church, and the dim light of the few candles which were in requisition was quite inadequate to enable those visitors who had not previously seen the building to fully appreciate its beautiful architecture. This disadvantage was in a great measure compensated for by the address given by Mr. Brock, who said that the body of the church was one of the most beautiful specimens of Early English architecture which the country contained. It bore great resemblance to the Lady Chapel of St. Mary Overy, although far superior in loftiness and size, and there was at any rate, he hoped, an absence of rashness in the statement he had made that the designs of both structures probably emanated from the same hand. He referred in terms of commendation to the public spirit which had restored the church from the deplorable state which it presented at the beginning of this century, although the facing of the walls of the round portion of the church with smooth stone in lieu of the pre-existing rubble work was an instance of zeal untempered by knowledge. However, a great deal that was good had been done, and the custodians of the church were especially to be commended for the care they now took of the building and of the recumbent effigies now preserved in the round portion of the church. In conclusion, Mr. Brock expressed the thanks of the Association to Mr. Hall Dare, Sub-treasurer of the Inner Temple, and the Dean of Llandaff, Master of the Temple, for the facilities they had given for the visit to the church.

A projected inspection of the Hall of the Middle Temple was given up for want of time, and the company separated until the next day, hoping for finer weather.

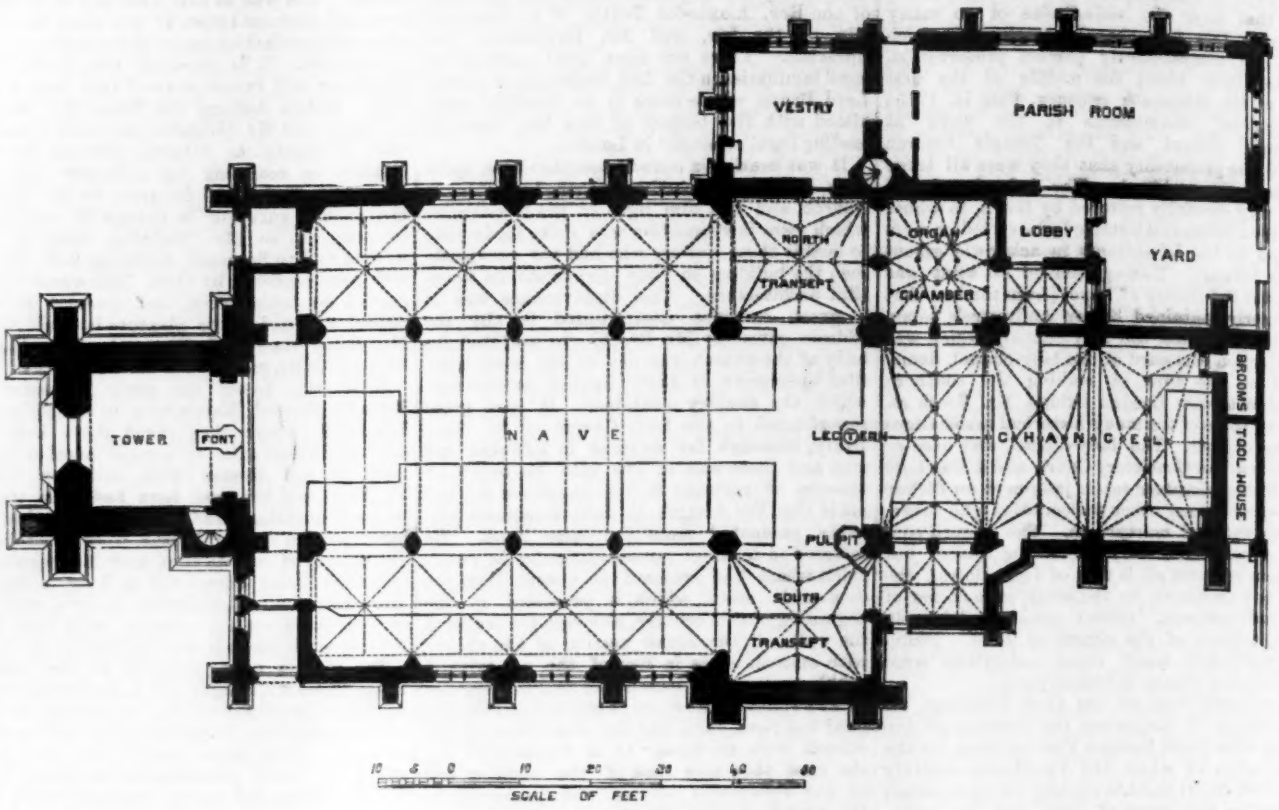
On Wednesday morning the rain was, if anything, more persistent in the spoiling of an archæological outing than on the previous day, and it need hardly be said that the party did not obey the behest of the programme by assembling "in the garden of Trinity-square, Tower-hill." A large party, however, their ardour nothing damped by the weather, did assemble in the waiting-room at the entrance to the Tower precincts and wherever else they could get under cover, and shortly after half-past ten o'clock were very kindly met by General Milman, C.B., Major of the Tower, by whom, and by Mr. Thomas Morgan and Mr. Compton, assisted by other gentlemen hereafter mentioned, the visitors were conducted in and around the fortress, many members of the party penetrating every accessible nook, and most of them ascending every tower which is not modern. The jewel-house, the armouries, and other of the usual "sights" of the place were not forgotten, neither were the recently-restored church of St. Peter-ad-Vincula, on Tower-green, and the exceedingly interesting chapel of St. John in the White Tower, omitted. Beneath the floor of the former lie the mortal remains of many royal and illustrious personages who fell by the executioner's axe; and the latter is, as Mr. Brock took occasion to point out, the earliest example of Norman work we have to which a date can be positively assigned. It was built between 1080 and 1090, and exhibits all the characteristics of Early Norman architecture, the masonry being axed on its surface and laid with wide joints. Of the different places visited, the lower part of the Well Tower (one of the towers of the outer ward, at the south-east end of the river frontage) was one of the most interesting. It consists of a vaulted chamber about 15 ft. long by 10 ft. wide, lately cleared out and conservatively restored, all old work being left untouched. It is utilised as a living-room for one of the warders, and a winding-stair of stone gives access to an upper chamber, used as a bedroom. In this apartment, and elsewhere, the inscriptions and some masons' marks have been carefully protected by movable hinged covers of oak. One of the most interesting sights of the day, however, was that presented by what was declared by Mr. Brock and other authorities to be a veritable piece of the old Roman wall, just uncovered during some excavations near the White Tower. The wall at this point is 7 ft. in thickness, and contains layers of the usual flat tiles, alternating with thick layers of fine rubble-mortar or concrete. It is expected that further explorations will reveal more of this part of the wall. Before leaving the Tower Mr. Morgan proposed, and Mr. Compton seconded, a cordial vote of thanks to General Milman for his courtesy in receiving the company and conducting them over the fortress; to Mr. Taylor, Government surveyor in charge of works now in progress; to Mr. McLishe, clerk of the works; and to Sergeant Andrews, R.E., for the assistance rendered by them. This was of course carried by acclamation, and General Milman replied, expressing the pleasure it would afford him at any time to facilitate the inspection of the fortress by members of the Association.

From the Tower the party proceeded to Barber's Bonded Warehouses in Cooper's-row, Tower-hill, where they dived down into the extensive wine-vaults to inspect another fragment of old Roman wall, touching which Mr. Brock said the wall here had been traced to its foundations, and it was found that its lower portion was of Roman work, containing two courses of Roman tiles, each laid regularly, and each being traced for a long distance. These were, he said, evidently *in situ*, and the contrast between the Roman work and the Norman work above it was most striking.

The visitors next proceeded to the Trinity House, where Mr. Morgan, F.S.A., read an interesting paper descriptive of the topography of Old London and of the characteristics of the Tower as a fortress. This paper would have been read within the Tower precincts but for the badness of the weather, and in the straits to which the company was reduced the authorities of the Trinity House very kindly granted hospitable shelter for a time. Here Mr. Brock again referred to the fragments of Roman wall which had been seen by the visitors, remarking that he was at a loss to understand those who sought to maintain that the Romans did not build a wall round London, although they took care to circumvallate the provincial cities. On the motion of Mr. Williams, one of the Bristol contingent, a vote of thanks was given to Mr. Morgan for his paper, and at the instance of Mr. Compton thanks were tendered to the Corporation of the Trinity House (coupled with the names of Mr. Allan, the secretary, and Mr. Inglis, the sub-secretary) for the use of their premises. A projected visit to the Church of All Hallows, Barking, Tower Hill, having been abandoned, the party proceeded to luncheon at the London Tavern, Fenchurch-street. After luncheon, other items on the programme underwent excision, these including the Church of St. Andrew Undershaft, the Church of the Austin Friars, and Cripplegate Church.

The only churches visited after luncheon were St. Katherine Cree, Leadenhall-street, and St. Helen's, Bishopsgate. At the former the Rev. Dr. Whittemore, the rector, and Mr. Brock, explained the principal features of the church, which, as was also pointed out by Mr. Godwin, is very notable as having been built at the very time when the Gothic and the revived Classic or Renaissance architecture were battling for supremacy. It was extraordinary to find a church with the Classic columns and imposts of the arcade and the cinque-foil headed windows and groining all co-eval. In Godwin's "Churches of London," as Mr. Brock stated, the date assigned to the older work (the remains of the tower of the preceding church, and through which the present church is entered) is 1509. The building of the existing church was commenced in 1628 and finished in 1631. It has been attributed to Inigo Jones, but whoever was the architect, the Catherine-wheel window at the east end was evidently, in Mr. Brock's opinion, designed by some one who was familiar with the large circular window at the east end of Old St. Paul's. Among the tombs in the church is that of Sir Nicholas Throgmorton.

The company next proceeded to the Church of St. Helen, Bishopsgate, where, however, the gas could not be turned on. The few candles hastily procured only sufficed to give those who had not previously seen the church a faint glimmer of its beauty, and many present resolved to make themselves better acquainted with it hereafter. The church was described by Mr. Godwin, who, after referring to the many evidences of Roman occupation of the locality, said that one writer had asserted that there was a church here in 1010, but the evidence he adduced was not convincing. It was known



ST. MARK'S, MILVERTON.—*Plan.*

however, that a church here was made over to the Canons of St. Paul's in 1180. In 1210, the Priory of the Holy Cross and St. Helen was founded here, in honour of Helena, the mother of Constantine, and the discoverer of what was believed to be the true cross, the desire to gain possession of which led to the Crusades. The present church was part of the original priory buildings. It is divided into two aisles by an arcade down the middle, and the northern side or aisle was formerly the nuns' choir, and was screened off from the southern half of the building. The priory buildings extended northward, and there was in existence until 1799 the nuns' hall, with a fine crypt beneath it. The hall above the crypt was for a long period occupied by the Leathersellers' Company as their hall. Having dilated further on the architectural features of the church, Mr. Godwin mentioned several incidents of interest connected with the many eminent men who lay buried here, Sir John Crosby and Sir Thomas Gresham chief among the number. The church was remarkable for the number and richness of its monuments, and on that account it had been called by more than one writer, "the Westminster Abbey of the City." That such an appellation was not undeserved would be seen from the statement that the church contained twenty-five handsome monuments of important personages, besides smaller ones and a large number of brasses. The most important of the monuments from the Church of St. Martin Outwich have lately been brought here, owing to the demolition of that structure and the union of the parish with that of St. Helen.

On the motion of Mr. Morgan, seconded by Mr. Lambert, thanks were given to Mr. Godwin for his discourse, and most of the company ended their three days' outing by a visit to Crosby Hall.

A visit to the British Museum was arranged for Thursday.*

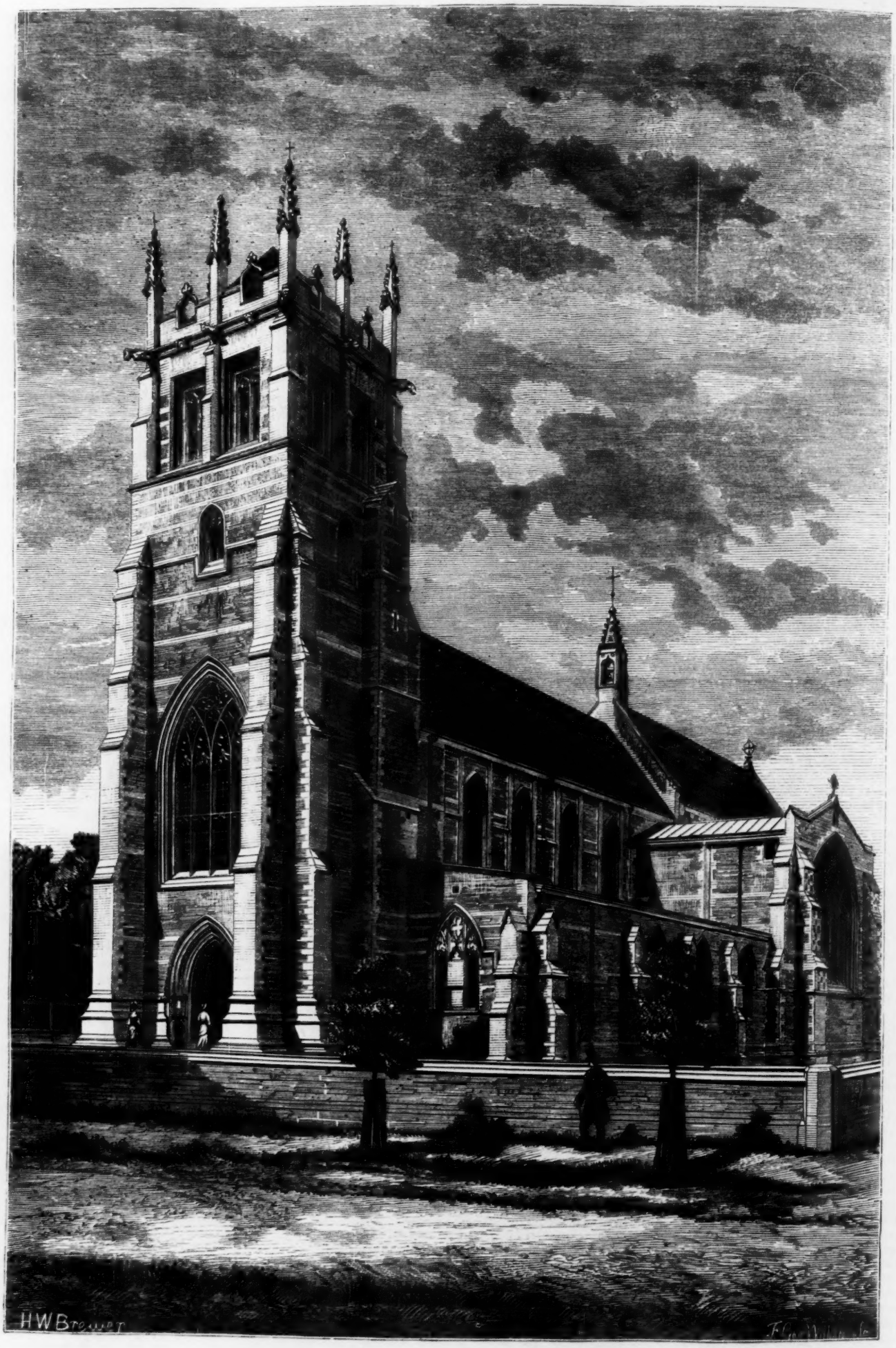
ST. MARK'S, MILVERTON.

The new church recently erected at Milverton by private munificence takes the place of an ugly old chapel known locally as the Pepper-box. The new building is in the Decorated style, in some parts treated freely. We give a view and plan of it. The materials used are red brick with Box stone dressings. The buttresses are all of Bath stone, and the roof covering is of plain tiles. The internal arrangement comprises a chancel at the east end, a lofty nave, north and south aisles, and at the west end a substantially-built tower, in which it is proposed to place a peal of eight heavy bells. The chancel is 49 ft. by 27 ft., and about 51 ft. high. It is lighted by seven mullioned windows, three on the south side, three on the north, and the large east window over the communion-table. The roof of the chancel is composed of wood-groining, with carved oak bosses. The precedent for this part of the work is to be found in the lady-chapel of St. Alban's Abbey, and other old ecclesiastical buildings. The floor of the chancel is laid with black and white marble, and Minton tiles. The altar is a plain oak table, with dossal hangings and altar-cloth, which have been furnished from designs by the architect by Watts & Co., of Baker-street, London, who have also carried out the decorations of the vicarage-house under the directions of the architect. On each side of the table is a tapestry curtain, fixed against the wall; and the sides of the chancel, above the stone sedilia, are in like manner hung with tapestry. The kneeling-desks are copied from those in the Beauchamp Chapel, Warwick. The lectern is founded on an ancient model, and has been excellently worked out by Watts & Co. The pulpit and choir-stalls have been executed by Messrs. Farmer & Brindley, of Westminster Bridge-road, who have efficiently carried out the carving throughout the church. The nave is separated from the chancel by an arch with carved angels at the springing-points, bearing in their hands musical instruments. The nave is about 87 ft. long by 32 ft. 6 in., and the north and south aisles 40 ft. by 15 ft. 8 in. The seats are open oak, and altogether there will be accommodation for nearly 1,000 persons. The roof of the nave is noticeable for its height, nearly 53 ft. It is an open roof, and is left for coloured decorations. The front of the first row of seats and the back of the last row are carved with sunken tracery. The floor of the church is laid with blue and brown York paving. At the end of the nave there is a tower, 18 ft. square, in which is placed a font, the base of which is Mansfield stone, the pedestal marble, while the bowl, which is of alabaster, is supported by eight columns, and is carved with angels. The cover is a carved wooden canopy, nearly 12 ft. in height, and balanced by a gilt cross suspended from an enriched beam. A wooden panelling about 5 ft. in height is carried all round the church against the walls. The adoption of this arrangement gives a warm effect to the church, and is a source of much comfort to those whose seats are near the walls, or who have to stand against them occasionally, or against the pillars. The bottom of the tower at the west end is lighted by a large mullioned window. A spiral staircase in the south side of the tower leads up to the belfry. The side aisles are lighted by three large traceried windows, and the nave by four small clearstory windows on each side. Haden's hot-air apparatus has been introduced for warming purposes, and the lighting arrangements include gas jets along the nave beneath the clearstory windows, and gas standards in the aisles. The pulpit, which is of carved oak, stands on the south-west side of the chancel arch, and is surmounted by a carved canopy. It is the production of Messrs. Farmer & Brindley. On the north side is a chapel (above that an organ-loft), a vestry, and a parish-room for the transaction of parish business. There are also two small chapels on the south side. The groined roof in the chapel beneath the organ-loft is noticeable.

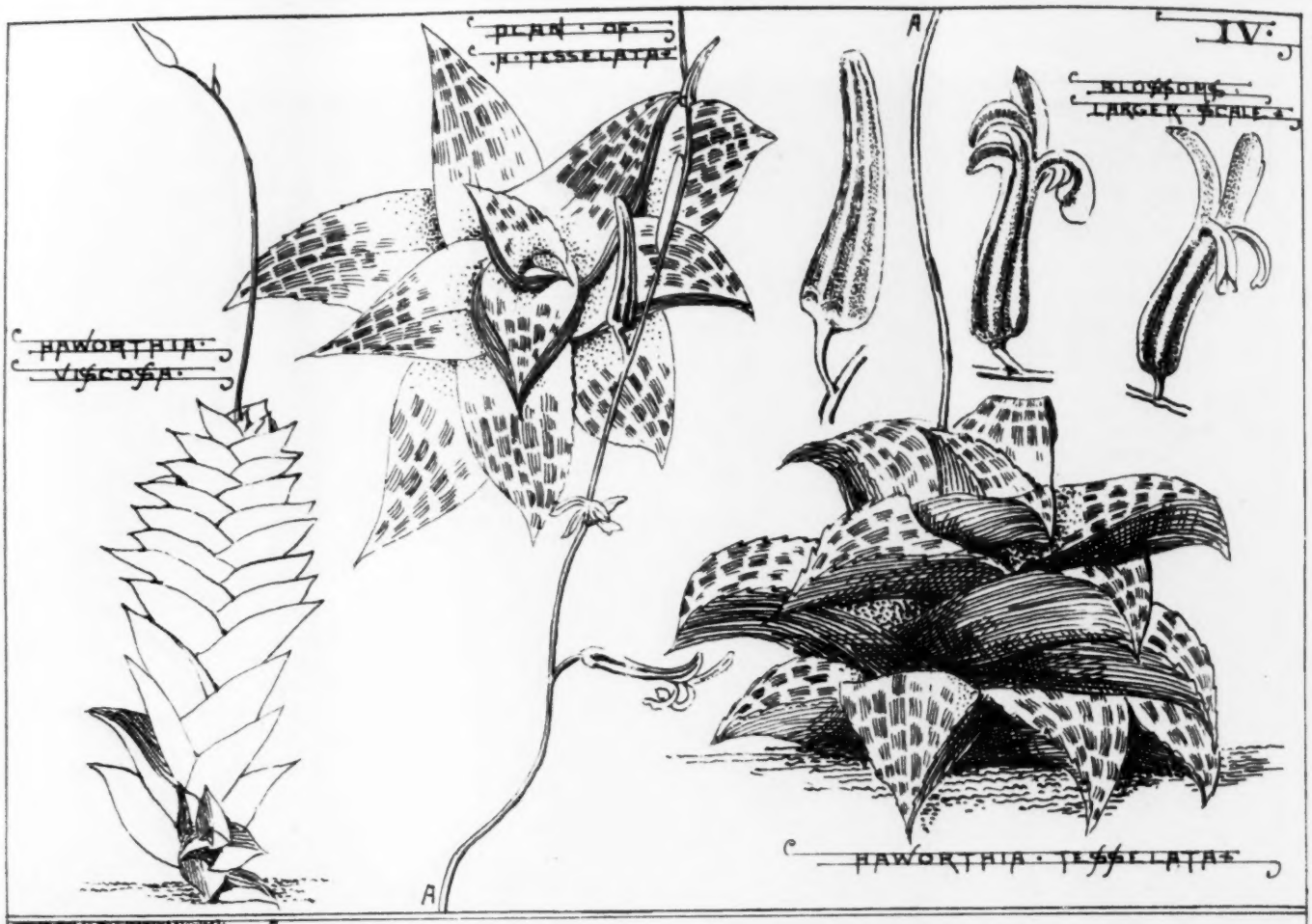
The architect is Mr. George Gilbert Scott, M.A. This church is one of a series of architectural works which have been entrusted to Mr. Scott, amongst which we may mention the new halls at St. Peter's and Christ's Colleges, Cambridge, the extensive works now in progress at Pembroke College, Cambridge, and St. John's College, Oxford, Garboldisham House, Norfolk, and several new churches in different parts of the country, including one at Kennington, and one at Southwark, both of which are of large size.

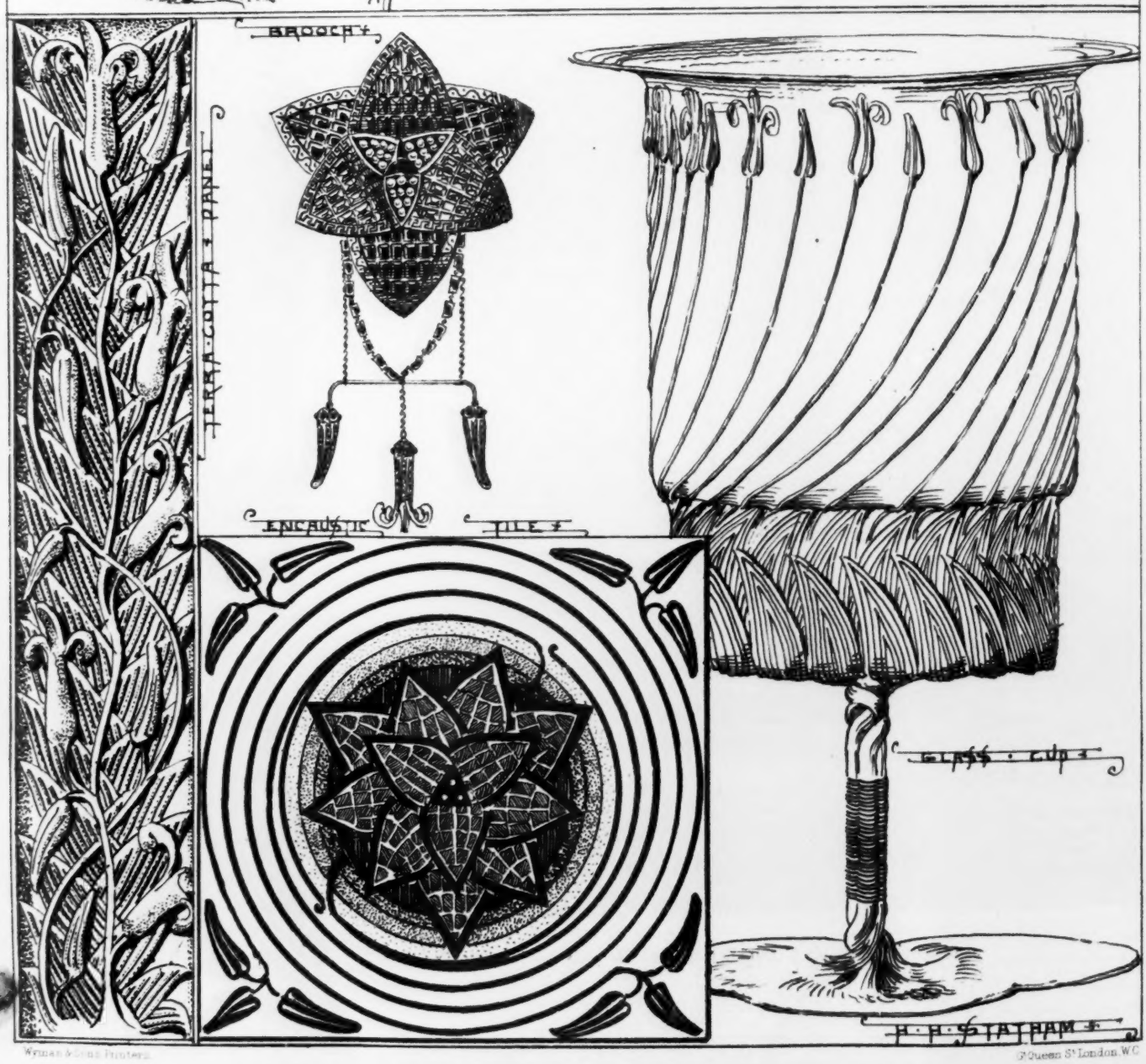
The work has been carried out by Mr. G. F. Smith, builder, Milverton; Mr. T. Godfrey, of London, being the architect's clerk of the works. The site of the church has been given by Lady Charles Bertie Percy, and the font is also the gift of the same lady. The entire cost of the buildings, including the vicarage adjoining, comes from the estate of the late Lady Wheler. Her ladyship devised a sum of 9,000*l.* for the purpose of providing a new church for the district of New Milverton, and the remainder of her property went to her two brothers, Mr. Edward Shepheard Carus-Wilson, of Truro, and the late Rev. Carus-Wilson, who was formerly Vicar of New Milverton, and who died suddenly while travelling on the Continent. These two gentlemen have erected St. Mark's, at a cost of 35,000*l.*, and have also provided an endowment fund of 6,500*l.* as a memento of their sister, the late Lady Wheler.

* The visitors are indebted to Mr. G. Wright, Mr. Patrick, and Mr. Reynolds for the arrangements which enabled them to see so much in so short a time.



ST. MARK'S, MILVERTON.——Mr. G. Gilbert Scott, F.S.A., Architect.





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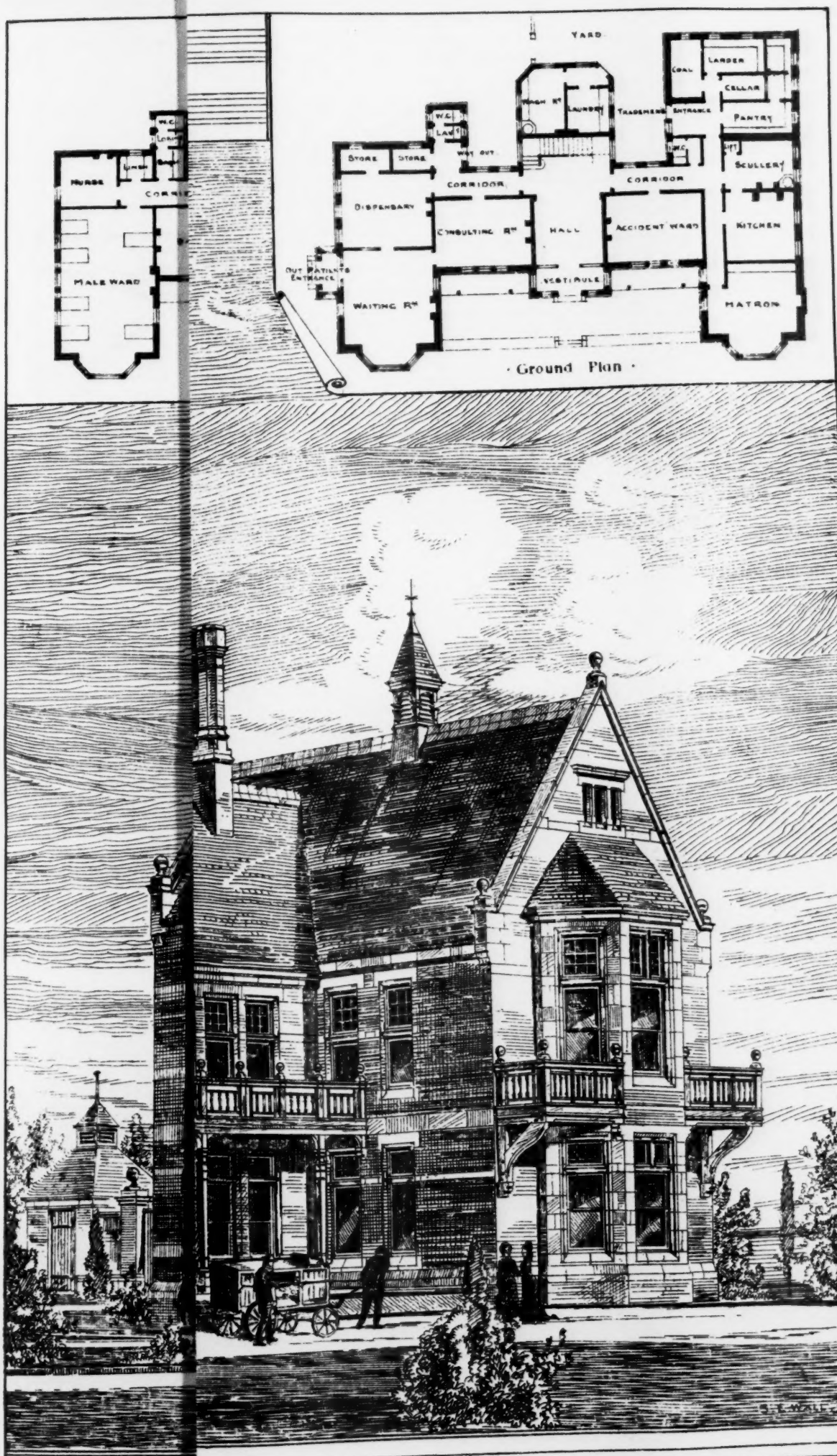

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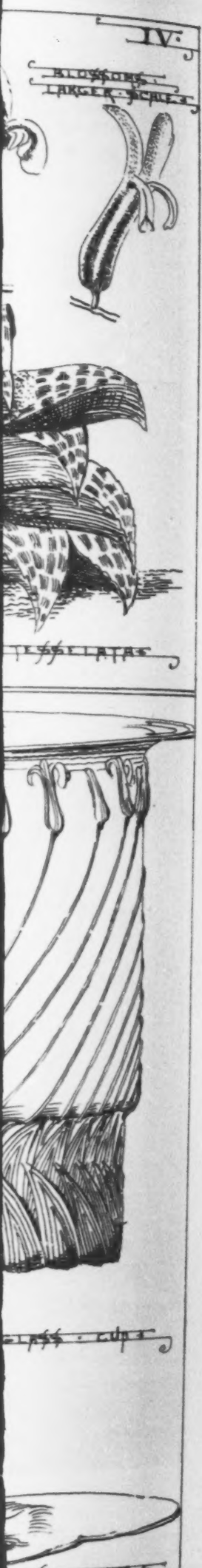
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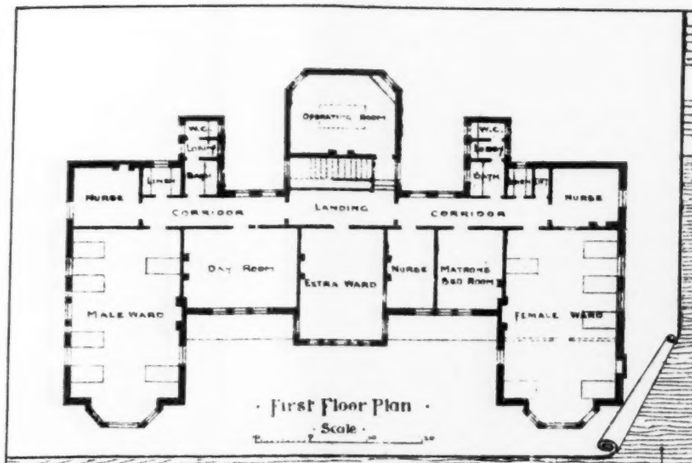

· First Floor Plan ·
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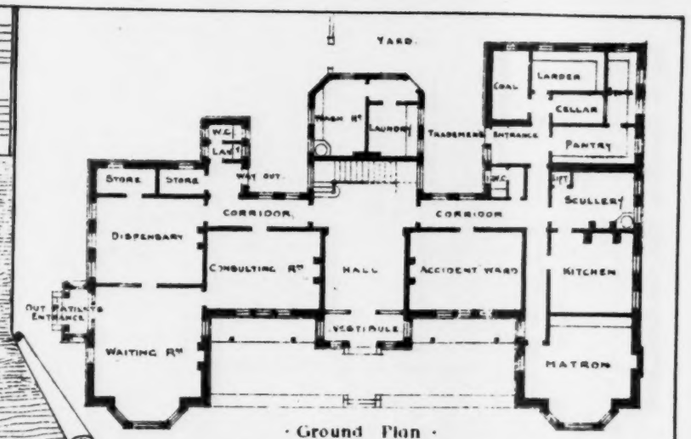
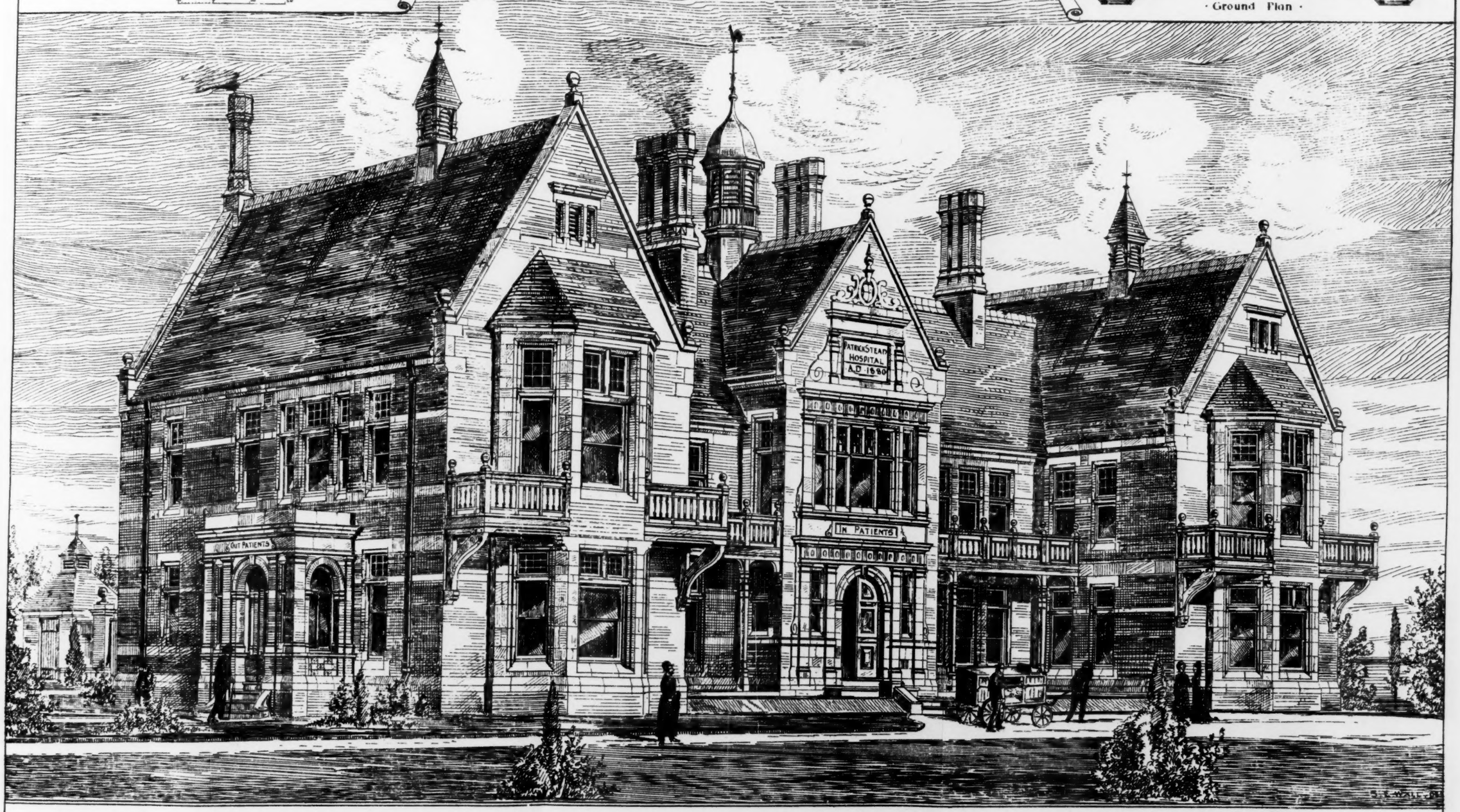


· Ground Plan ·



19 Doughty St
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PERSPECTIVE VIEW
From the South West

Henry Hall FRIBA
Architect

Whiteman & Bass *Photo Litho* 236 High Holborn

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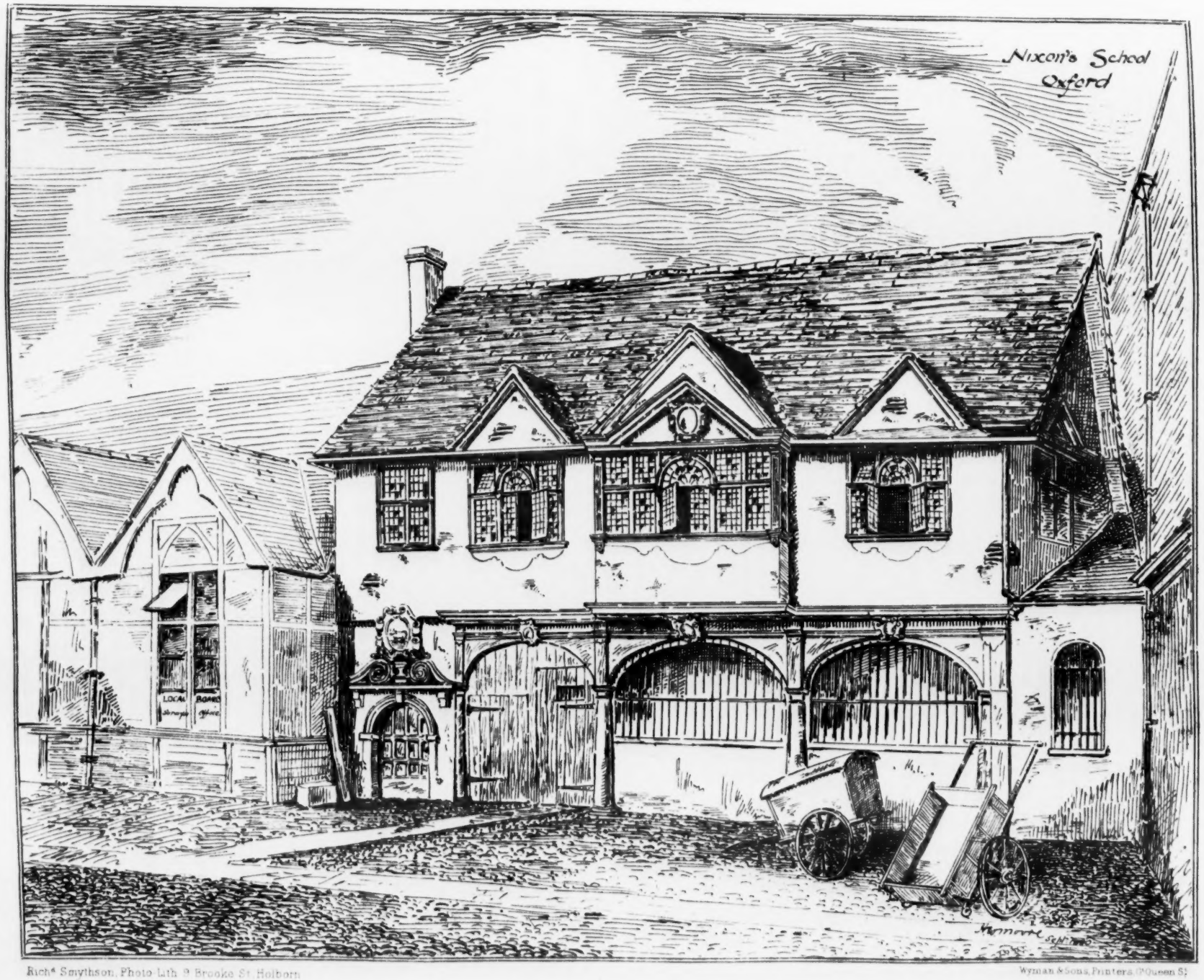

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DECORATIVE SUGGESTIONS FROM NATURAL FORMS.—No. 4.

Haworthia is a tribe of dwarf aloes, of which there are many species; the two figured here (*viscosa* and *tesselata*), which are drawn the natural size, while they mimic in the body of the plant the usual characteristic of design of the aloe tribe, thick infolded spiky leaves, send out long slender shoots, adorned with blossoms of the most exquisite and delicate design, such as seem to have no relation to the general character of the plant from which they spring. In the specimen of the *tesselata* from which this sketch was drawn the shoot bearing the flowers was about 18 in. long; only a part of it is shown here. The blossoms are drawn larger size, in order to show something more of their design, the delicacy of which, however, can be but inadequately expressed with a lithographic pen.

The specialty of these specimens of Nature's design consists in the combination of the short spiky aloe leaves, with the long, fine stalk and delicate blossoms: this is the idea aimed at in the designs based on it. In the tile the body of *Haworthia tesselata*, seen in plan, forms the centre, and the stalks are twisted round and round it, while they carry the blossoms to fill up the angles. The special marking of the main leaf, from which the plant derives its specific name *tesselata* (as if laid with *tesseræ*), makes it very suggestive as a feature for tile design. In the sketch for a brooch above, the tesselated idea of the leaf is carried out by the arrangement of the stones which are set in it, and the buds and flowers droop from it, as a pendant, instead of rising from it. In the glass cup the main leaves of the *viscosa*, which bears nearly the same flower, are on the same principle made the base of the bowl, while the long stems arise from it, and twine round the upper portion. The slight sketch of a panel for terra-cotta shows the two elements in the plant superimposed, instead of following the natural order of growth one from the other.

It will be obvious that we do not attempt to keep to any special scale in drawing the artificial objects: their intended scale must be indicated by their character. Thus in the present case the brooch and the cup would be taken as full size, and the tile would work well at about twice the size shown.

PATRICK STEAD HOSPITAL.

This design was accepted in open competition, the committee adopting the selection of Mr. J. K. Colling, architect, who was appointed referee. The committee's instructions required the arrangement of dispensary, waiting and consulting room, with a separate entrance for out-patients, accident ward, kitchen, and offices, male and female ward for six beds each, day or convalescent room, operating-room, and the necessary bedrooms for matron, nurses, &c. The plans will sufficiently show the disposition of the requirements, special care being taken to obtain compactness and economy in working. Mr. Henry Hall, of Doughty-street, is the author of the design, and the work is being carried out under his direction, the builders being Messrs. Howard & Son, of Halesworth and London.

NIXON'S SCHOOL, OXFORD.

This picturesque old building is situated in the Town-hall yard, at the back of the Post-office. It is built of timber and plasterwork, the entrance doorway being made a little more important by some stone dressings and an ornamented shield over, carved with the city arms. The school is held on the first floor, the ground-floor being appropriated for post-office purposes. It was founded in 1658, by John Nixon, a worthy alderman, to provide free education for forty boys of the city. A master's residence used in old times to adjoin the school (in the left-hand corner of the sketch), but this has long since been demolished. The old school may probably soon share its fate, as preparations are, it is said, in train for building fresh premises elsewhere. H. W. M.

Association of Municipal and Sanitary Engineers and Surveyors.—The Lancashire and Cheshire District meeting is to be held at Salford, on Friday, the 5th of November.

SMOKELESS LONDON.

Sir,—It so chanced that, remembering an article which appeared in your columns on the 21st of February last on the subject of fog, I was just about to address you on the return of the London fog season, when the number of the *Builder* containing your more recent remarks on the very subject reached me.

With the greater part of that article I fully concur. The difficulty that I feel as to altogether agreeing with its outcome is this:—Coal, as we buy it, is a natural product. It is one that is remarkably free from adulteration. Slate, or bricks, or other materials, may be sold by the roguish dealer as coal, but the fraud is easy of detection. There is good coal and bad coal, but the consumer can learn, at little trouble, the earmarks of the different qualities of the mineral, and can purchase (if he goes to a respectable coal-merchant) that kind which suits him best.

Now, it is very possible that an artificial fuel may be produced which shall be better than coal,—at all events, in the matter of smokelessness. But this has yet to be done; that is to say, to be done in so simple a manner that the purchaser will be able to obtain a ton of smokeless fuel at a fair price, and with as much certitude as to what he buys as if he ordered a ton of Hartley's Walls-end. The first thing, then, it strikes me, that would be necessary, in order to introduce such a general improvement in fuel, would be the production of so distinct a manufacture that there would be no room for adulteration or for cheating, so that the purchaser would know what he was doing as well as if he ordered a ton of any given quality of coal.

Practically speaking, this can only be done by the gas companies. The first step, then, it seems to me, towards giving any practical sequence to your suggestion, is to ascertain how far any gas company would be prepared to submit coal to a much less destructive distillation than at present, with the view of offering the public a fuel that would be intermediate between coal and coke. I do not feel prepared to offer an opinion as to the feasibility of the plan. But it seems to me that the way to put it to a practical test will be to make such an application to a gas company. It would probably be found that a considerable alteration, not only in their mode of procedure, but in their retorts, would be necessary to carry out the plans. But it is only by manufacturers of gas on a large scale that it would be economically possible for the scheme to be effected.

My own views point in another direction,—indeed, in that indicated by your former article to which I referred as to the use of gas as fuel. Dr. Carpenter, I observe, suggests that a poorer gas than that ordinarily used might be made for the purpose of combustion for calorific purposes. It must be remembered, however, that a great demand for gas as fuel must be established before it would be worth the while of any one to lay down a new set of pipes to convey this less carboniferous gas wherever it was required. Meantime we have to see what is to be effected with ordinary coal gas, of which the calorific value is so much higher than the luminous value, that more light can be produced by a dynamo-machine, driven by gas, than by burning the same quantity of gas directly for light.

This leads me to another part of the subject; and it is one in which the key to the question will, I think, be found to be hidden. It may be described as carrying out the reflections you suggest as to heat of combustion; but looking at the matter upside down, or in the reverse direction to your view. You say combustion, to be perfect, requires a high temperature. I fully agree. But do we take the proper steps to attain a high temperature? I think we go in quite the contrary direction. Your illustration of the hot-blast is precisely one of the facts on which I have based my opinion. I may add the example of the air-furnace, a contrivance that I have often watched at large works in Staffordshire, in which a nearly perfect combustion is effected by a very simple arrangement. The great requisite for perfect combustion is TO SUPPLY TO THE FUEL THE EXACT AMOUNT OF ATMOSPHERIC AIR NEEDED, AND NO MORE. It is here that our stove-makers err. "Plenty of air, plenty of draught, blow the fire!" is the cry, and the result is to blow so much unconsumed fuel away. For it must be remembered that every cubic foot of air that passes by, through, or over, a mass of burning matter unconsumed, carries off so many units of heat. It chills the fire; it makes smoke. With too little air the combustion flags. Smoke is thus produced from readily vaporisable fuel such as oil or paraffine. Give the exact quantity of air, and you have perfect combustion, and no smoke. Give too much air, and fuel that would not burn, and therefore would not emit smoke, with too little air, now sends out dense volumes of smoke, just in proportion to the chill caused by the excess of air.

I have made many experiments on this score, though they have been principally confined to the combustion of gas. So certain is the scientific basis of the theory, and so great an economy can be produced in the luminous effect of gas by the application of the rule, that I for some little time entertained sanguine hopes of being able to effect a very great reduction in the consumption of gas. My experiments, however, were brought to a close, not by any want of success, for the result went beyond my expectation, but because I did not see my way to an indisputable protection of my process, and thus to any remuneration for months or years of toil. I shall be glad, however, to communicate on the subject with any one who takes an interest in it, and who, by taking the matter in hand as a manufacturer, would not be obliged to rely exclusively on the validity of a patent. And I may add that the first practical application of the method might be to the great desideratum of a better and brighter safety-lamp for the miner.

By regulating the pressure at which ordinary coal-gas issues from the burner, and by proportioning the quantity of air admitted to the flame, the illuminating power of a given quantity of gas may be increased more than ninefold. I refer,—as a proof that I am not speaking without book,—to the report made in 1871 to the Board of Trade by the gas referees, in which it is shown that 1·65 foot of gas per hour can be so burnt as to produce by one method light measured as 7·36, and by another method light measured as 63·5. And in this experiment only a portion of the regulation that I purpose was effected. Now if this can be done in the consumption of gas, I do not see why something of the same kind should not be done in the consumption of coal. The question really comes to this. Are we so fondly attached to the barbarous custom of burning coal in an open grate, under a hole in the wall, that goes to the outer air, through which 80 per cent. or more of the heat is abstracted, that we refuse to attempt any improvement in the method of combustion? A great many people, no doubt, are. To those people it is of but little use to preach. Whether you offer them a smokeless fuel, or I offer them a perfectly consuming arrangement, we shall lose our labour. It seems to me that it is only by the argument to the pocket that this prejudice can be combated. Let us convince the public,—or the younger and convincible part of the public,—that they spend five or ten times as much in fuel as they need to spend, and than there will be a *που στω* for the smoke-reformers. As long as we only attempt to modify the open grate,—being careful to supply abundant air to our little furnaces,—so long shall we only increase our annual smokiness. But when we seriously put the question—"How can we warm our houses and cook our dinners most economically?" another state of things will become possible. When the question, "How shall we burn the thousands of tons of coal which we now daily send unburnt up the chimneys of London?" is once put in earnest, it will not be put without a reply. The answer is, "Economise, not only fuel, but heat. Secure perfect combustion by the exact regulation of the supply of air to fuel, and retain all the heat produced by that combustion for use, instead of sending it up the chimney." The margin is so wide, the economy to be effected is so immense, that there is an ample field for the inventor. In fact, it is as to details alone that invention is necessary. The first step to take for the prevention of smoke is the providing for perfect combustion. That step is at the same time a great economical gain. I do not say that London would be rendered smokeless in six weeks, or in the course of the ensuing winter. But I do hold that it may be rendered smokeless by the application of the principles I have ventured to suggest as cardinal, and that this can be done to the great pecuniary gain of every householder. F. R. C.

The Mansion House.—The Right Hon. the Lord Mayor Truscott has sent out invitations to meet members of the Royal Academy at dinner on Wednesday, November 3rd.

PRIVATE BILL LEGISLATION OF THE LATE SESSION.

The list of private Bills passed during the Parliamentary session of 1880 has just been issued, from which it appears that the total number of Bills of all kinds which received the sanction of the Legislature is 172. Of this number, 65 are Bills connected with railways, being about two-thirds of the entire number of Bills of this character which were promoted during the session, amounting to 100. Of the Bills passed, however, 41 only are for the construction of actual works, 24 of them being either for the abandonment of works, or for an extension of time for the construction of works already sanctioned. As regards 18 of the Bills which have become law, they are for the construction of distinct additional railways by entirely new companies, who are empowered to make new lines having an aggregate length of 224 miles, at an estimated outlay of 5,790,299*l*. Nine of these intended new railways are in England, their total length being 131 miles, and their estimated cost 5,306,966*l*. The most important of the new English lines is the Hull, Barnsley, and West Riding Junction Railway, which is 67 miles long, and will involve an outlay of 4,000,000*l*. Four of the new railways are in Scotland, their length being 37 miles, and their estimated cost 845,333*l*.; four in Ireland, length 43 miles, cost 505,000*l*.; and one in the Isle of Wight, length 13 miles, cost 133,000*l*. The number of Bills promoted by existing companies for new works which have received Parliamentary sanction is 23. These several companies propose to construct an aggregate of 152 miles of additional railways and other works, at a cost of 5,298,900*l*., the intended additional outlay of the Midland Company alone being 1,800,000*l*.

The number of tramway Bills passed during the session is 14, authorising the construction of 114 miles of tramway in different parts of the country, at an estimated cost of 975,550*l*. The longest of these intended tramways are those at Huddersfield, which are 18 miles in length; Gateshead and South Shields, 17 miles; and Coventry and Nuneaton, 15 miles. The powers obtained by these three last-named companies authorise them to use steam power on their lines. It should be added that, besides the several tramway Bills sanctioned by Parliament, the construction of a large number of tramways has likewise been authorised by Board of Trade orders.

In connexion with the construction of new and extended gasworks in the different towns and districts of the country, nineteen Bills were passed during the session, the estimated cost of the various works authorised amounting to 1,204,000*l*. The largest intended expenditure on these works is 187,500*l*. at Eastbourne; 150,000*l*. at Reading; 150,000*l*. at Wandsworth and Putney; and 100,000*l*. at Maidstone. Twevе Bills have also been passed authorising the construction of new waterworks, at a total estimated cost of 4,056,400*l*., of which sum 3,250,000*l*. are for the works about to be carried out by the Liverpool Corporation for a supply of water from the rivers Vyrnwy, Marchnant, and Afon Cowny, in Wales, leaving 806,400*l*., as the estimated expenditure for the whole of the other works sanctioned. Of this amount 300,000*l*. are intended to be expended at Wakefield; 120,000*l*. at Edinburgh; 100,000*l*. at Great Yarmouth; and 75,000*l*. at Wrexham. The same remark applies to gas and water projects as to tramways, the Board of Trade having authorised the construction of such works in several towns at an estimated aggregate cost of 392,250*l*.

The town improvement Bills sanctioned are fifteen in number, authorising works of this character in Nottingham, Huddersfield, Preston, Oldham, Liverpool, Bristol, Aberdare, Burton, Glasgow, Kensington, Lancaster, Sandwich, Rochester, Wigan, and King's Lynn.

Case of Mr. Strachan, Architect.—In response to the statement made at p. 514, *ante*, we have received 1*l*. 1s. from Mr. Daniel R. Dale, of Union-court-chambers. We shall add 1*l*. 1s. ourselves, the case being well recommended, and will wait a week before transmitting the amount, in case any other of our readers should think fit to send a little aid. They have heard of the old epitaph,—

> "What I spent, that I lost;
> What I gave, that I have."

AN ELECTRIC LAMP.

A lecture on Electric Lighting was delivered by Mr. J. W. Swan, before the Literary and Philosophical Society, Newcastle-on-Tyne, on the 20th inst., in which the lecturer seemed to substantiate a claim to a further advance in the subject than has before been made, and to being before Mr. Edison in effecting the economic divisibility of the electric current. Having described the different generators of electric currents in use, and shown that all the means of producing light by electricity are divisible into two classes, namely:—

1. Lighting by the electric arc.
2. Lighting by incandescence,—

he went on to say:—Whilst Mr. Edison was endeavouring to produce a useful incandescent lamp by means of platinum, I was endeavouring to obtain the same end by means of carbon. It had appeared to me for many years that if ever electric light was to become generally useful, it would, most probably, be by means of the incandescence of carbon. I had, long before the time to which I am referring, attempted to render this idea practicable. As a matter of history I will briefly describe an experiment which I tried about twenty years ago. I had a number of pieces of paper and card of various forms and sizes buried in charcoal in a crucible. This crucible I sent to be heated white-hot in one of the pottery kilns belonging to Mr. Wallace, of Forth Banks. From the pieces of carbonised card which I thus obtained, I selected a long spiral, the ends of this I clipped between small blocks of carbon carried by uprights, and connected with conducting wires. A small glass shade was cemented over this mounted carbon spiral, and the air was exhausted by means of a very good air-pump, lent to me for the purpose of this experiment by the Rev. Robert Green, of Longhorsley. A good vacuum (according to the ideas that then prevailed) having been produced, I applied the wires of my battery (consisting of ten cells of Callan's modification of Grove's battery) with great expectation of a brilliant result; instead of this, there was the most absolute negative presented to me, not a vestige of heat or light appeared in my long ringlet of carbonised paper. It was evident, and I immediately recognised the fact, that the electric current of the strength I was using would not go in sufficient quantity through so long a piece of carbon as I had taken. I, therefore, repeated the experiment with shorter carbon and a greater number of cells, and I obtained, under these altered circumstances, an extremely interesting result. . . . .

After describing the way in which various difficulties were overcome, Mr. Swan exhibited his perfected lamp, and continued:—Is it not a pleasant light? It is not so white as the arc light, but yet a whiter light than gas. Colours are correctly seen by it, as this picture shows. But the great merit of this light consists in its not being in contact with air, and therefore there cannot possibly be the slightest air-pollution caused by it. The rooms in which this light is used will be as pure by night as by day. It is essential to economy in lighting by incandescence that the incandescent carbon should be very thin. The carbon I use is not one-twentieth the thickness of the thinnest of the carbons formerly employed, and therefore one-twentieth of the current costing one-twentieth the price, will produce in my thin carbon the same degree of luminosity as twenty times more current will produce in such carbons as were used in those ancient lamps. You will notice that in my lamp leakage is very thoroughly guarded against, the wire which passes through the glass not only having the glass fused around it where the wire and globe meet,—but in addition to this, the wire is coated with glass almost up to the carbon. In this way the vacuum is preserved very effectually. . . . .

With regard to distribution, I believe it will prove to be practicable to light any large town,—all Newcastle, for instance,—by means of wires laid in the ground as gas pipes are laid, and all branching from one centre, and conveying the electric current to lamps like this. . . . . The economy of lighting by incandescence has not been exemplified by so many instances of actual practical use. One thing is quite clear, and that is, that electric lighting by incandescence is an economical process,—it will be less costly than gas lighting. That is conclusively demonstrated by the fact that 1,000 feet of gas employed in working a gas-engine to develop an electric current, and used in my lamps, will yield more light than 1,000 feet of gas consumed in the ordinary way in gas-burners. This room is now lighted by twenty of my electric lamps, and to produce the current which feeds them 160 cubic feet of gas per hour are being burned in a gas-engine; before my lamps were kindled the room was lighted by seventy gas jets, consuming, I am told on good authority, 210 feet per hour. It is very evident that we have got more light out of the gas through the medium of electricity than was got from the larger quantity of gas which those burners consumed. Our conditions here are somewhat unfavourable to my light for a fair comparison, but from measurements carefully made, both of light produced and current required to produce it, I am warranted in saying that at least twice as much light will be produced by a certain quantity of gas used to generate an electric current employed in my lamps, than would be obtained from this quantity of gas burnt in gas-burners in the usual manner. If that be so, then it is evident that when, instead of the motive power of gas, that of steam produced in the most economical manner is employed, this method of electric-lighting will be very much less costly than gas-lighting. I reckon that 40 lb. of coal employed in raising steam to generate electricity is capable of producing in my lamps the effect of 1,000 ft. of gas burnt in gas-burners in the ordinary manner. The economical view of the question is therefore, in my opinion, very favourable to electric-lighting, and I think fully warrants me in anticipating an extensive substitution of electric light for gas-light. The great difficulty which, till now, has completely blocked the way to any general use of electric light was *the difficulty of division: that difficulty is now completely overcome* by the method of producing electric light by the incandescence of carbon in vacuo.

DISADVANTAGES OF BACK STREETS.

NORTHERN ARCHITECTURAL ASSOCIATION.

At the annual meeting of the Northern Architectural Association, held in the Old Castle, Newcastle, on the 19th inst., Mr. Thomas Oliver, president, read a paper "On some of the Disadvantages of Back Streets in Towns." In his opinion, he said, the retention or abolition of back streets was merely a sanitary question, although there was an economic, as well as an æsthetic aspect of the subject well worthy of consideration. These streets arose out of a necessity, fifty years ago, viz., the removal of refuse, ashes, &c., but this necessity no longer existed, owing to the introduction of sewers, water-closets, and dust-bins. The back street had served its day, and they were now called upon to substitute, under the altered circumstances, a cheaper and a healthier arrangement for the laying out of the environs of dwellings. Before doing so he would draw attention to some of the disadvantages at present felt. The streets themselves, even when paved, were not unfrequently dirty and badly swept, and in remote places they were rarely attended to. They gathered the scattered refuse from neighbouring places, and in windy weather this refuse came whirling in eccentric eddies to the entrances of the back streets, and after passing up and down, left a deposit of straw, paper, old rags, and other filth. The look-out upon the ends of these lanes, from houses on the opposite side of the street, was far from being picturesque or pleasant; for, according to the hour of the day, they might have presented to them the beggar, the thief, the burglar, the burglar's female pioneer, the sweetheart, the tradesman's boy, or the obscene drunkard and vagabond. The view from the back rooms of the houses themselves was not by any means interesting. People thought they could not, and therefore they would not, keep such places clean and respectable. The whole of the ground, both of the yard, outbuildings, and back street, was wasted; for there might be grass, flowers, shrubs, and other healthful or useful things. Just think of the air, after passing over the insalubrious places referred to, entering the bedroom windows, just being closed for the night,—what a mixture of the pure and impure for the sleeping inmates to breathe for the next eight or nine hours! New estates were being laid out, and new streets built up, with a waste of 20 ft. at the back of each double block of houses, while dirty yards and unsavoury outbuildings, for which there was no need, occupied the place that ought to be devoted to grass and trees. During his visit to various cities on the

Continent, to the metropolis, and some of our own more ancient towns during the last 25 years, he had been struck with the absence of the back street nuisance. This led him to suggest in 1875, to a gentleman in Newcastle, the desirability of laying out his estate at Jesmond on the principle he (the speaker) advocated. The Corporation were not yet prepared to carry out the principle, but he had no doubt that they would do so. The plan represented a rectangular plot of land with houses on all sides. There was a small area in front of each house, which was appropriated to dust-bin, coal-place, &c. There were no back streets and no back yards. The back portions were laid out as gardens with low division-walls between the respective portions. The flow of air would be greater than that provided by the back-street system, and it would be quite pure. In the place of unsightly out-buildings there would be gardens capable of growing trees, and large enough for grass lawns, valuable both for pleasure and utility. By adding the quantity of land saved by the back street, it was proposed to make the houses wider in frontage than usual (20 ft. to 24 ft.), and thus obtain three or four rooms on each floor, each room having what might be termed a front view. If the plan were adopted, not only would there be a larger proportion of land to sell, but the tenants or purchasers would be freed of the cost of paving and flagging. It would be a saving of rates, and would certainly redound to the credit of the Corporation officials, as they would be relieved of one of the most unwelcome duties they had to perform.

SOME RECENT METHODS OF TESTING PORTLAND CEMENT.

At the usual meeting of the Manchester Association of Engineers (employers, foremen, and draughtsmen), on the 9th inst., Councillor W. H. Bailey, of the Albion Works, Salford, read a paper on "Some Recent Methods of Testing Portland Cement."

Mr. Bailey said Portland cement, as a material of construction, had increased in popularity during the last twenty years, but especially so during the past five or six years, owing entirely to the scientific methods used both in its manufacture and in the methods of testing the material by those engaged on government, municipal, and other large works. At a recent meeting of the Institution of Civil Engineers a communication was read from Mr. Higgin, who has charge of the extensive operations at Buenos Ayres, under the direction of Mr. Bateman, as engineer-in-chief. The sum of 2,000,000*l.* sterling has been spent in city improvements there, and the spending of this money has afforded a good opportunity of showing what can be done with cement concrete in almost every form that could be devised. No stone was to be obtained in Buenos Ayres; in a radius of 200 miles not a pebble could be found. When the works were begun the province produced no bricks fit for use, and recourse to concrete became imperative. About eleven miles of large subterranean conduits had been built almost entirely of concrete, as well as twelve miles of intercepting-sewers, and twenty to thirty miles of collecting-sewers. Concrete has been used for the workmen's houses,—for the roofs of engine-houses, in the copings of walls, tops of columns, retaining-walls, filters, settling-beds,—indeed, for every conceivable purpose. Mr. Higgin states that for all the fine work the mixture used was one part of Portland cement to six parts of coarse sand. Portland cement is composed of silica, alumina, and carbonate of lime. This is produced by mixing clays and limestone or chalk in combination with water, which mixture, after being baked and calcined in a kiln, is ground to fine powder. Mr. Henry Reid, who has written many books on the subject, insists that it is absurd to send this useful material many miles any where, as the ingredients for its manufacture can nearly always be found at one's elbow if we only look. In many rivers and creeks the raw material exists. Common flint, pit-clay, marine-clay, the shales and sand of Warwickshire, Derbyshire, Northamptonshire, and Somersetshire, should be used for cement-making. For the like purpose Mr. Reed names the basaltic columns of the Giant's Causeway, the limestone formation at Kendal, and the various lavas and slate deposits in different parts of this country. The strength of Portland cement increases with its fineness. The most popular method of testing the cement is by subjecting it to a severe tensile strain; but much can be said in favour of testing by compression, and the latter would be more in use but for the costliness of the apparatus. Mr. Bailey described a simple hydraulic compressor for the testing of Portland cement, which he had designed. It was possible, however, that cement should be tested both for tensile strength and resistance to crushing. Professor Thurston (America) has introduced a method of testing by torsion or twisting. The Thurston tester not only gives the torsional resistance, but also the limit of elasticity and the exact angle of torsion. The limit of elasticity is the amount of twist a material will bear without becoming permanently distorted. The quality of elasticity is of considerable importance in a cement, especially where it is used for concrete work in footpaths and roads. Mr. Arthur Jacob, the borough engineer of Salford, has given considerable attention to the tensile testing of Portland cement. He has introduced cylindrical moulds. The shape is perfect, and by a careful filling of the moulds and exact measurement of the water used in each case, tests are made under conditions which seemed to him (Mr. Bailey) to be rigidly equal in every particular. Mr. Jacob's machine has the weight,—which consists of a long can into which a small stream of water flows,—placed at the end of a lever. This enables the test to be applied in a very gradual and nearly imperceptible manner, without any vibration; in fact, the operator may sit down and watch the machine, after the tap has been turned on, until the fracture is effected. The height of the water in the cistern is indicated by means of a glass tube similar to the water-gauge glass of a steam-boiler, the graduation being painted down the can or cistern. When the material is broken, a small trigger closes the tap, and prevents any further supply of water. So uniform are the tests by Mr. Jacob's system, that, with good cement, the figures obtained scarcely vary. On the 26th of September, six samples were taken from one bag, and were tested, with the following results:—810, 815, 820, 820, 820, 820. Mr. Bailey said he had had considerable experience of testing, but with any other form of clip, and under the most careful conditions, no results like these had ever come under his observation; and if tensile strain is the proper one to place on Portland cement, Mr. Jacob, he thought, had introduced the most perfect form of testing. But it was desirable to caution those who consider a high tensile strain the best, that this mode may result in the manufacture of a dense and treacherous cement, and elasticity was a quality which in future would have to receive quite as much attention. In past years Portland cement has been ill-treated. Ignorant and unscrupulous persons have sold and used cement under that name, and have brought it into undeserved disfavour. For workshop use it is invaluable. It preserves iron; indeed, it is used for preserving the insides of iron boats. Its uses and applications are innumerable,—tanks, walls, foundations, piers, solid lighthouses in one piece, are built of it. As its qualities become better known to mechanical engineers, it will be more extensively employed than at present.

Mr. W. H. Bailey, in replying to several questions raised in the discussion, said that sand intended to be used in the mixing should be dry, and the process of mixing carried out under cover. The quantity of water used in mixing was ¼ lb. to every pound of concrete. Too much care could not be taken in the mixing, and in many instances where cement had failed, such failure had been clearly traced to some want of attention in this particular. This had been proved by the entire destruction of a large breakwater in the South of England from the simple reason of a few rusty nails getting into the cement during the mixing.

Clarkson Memorial.—It has been proposed for some time to erect a memorial of Thomas Clarkson, in his native town of Wisbech, and we published a view of the design by the late Sir G. Gilbert Scott, R.A., which had been selected. About 2,000*l.* were required for its completion, towards which the sum of 1,400*l.* has been contributed. The want of a suitable site has occasioned delay, but this difficulty being removed, the committee have accepted a contract for the memorial (without the statue and bas-reliefs), and the first stone was laid on the 25th by Mr. Jonathan Peckover, the treasurer. Mr. Charles Gane (Wisbech), ex-mayor, or Mr. John Leach, will gladly receive subscriptions, so that the design may be completed.

"CLOSET" CONSTRUCTION.*

Great importance must necessarily attach to the deliberations of an Institute like this, which aims at disseminating information, and guiding public opinion on sanitary matters. It may, however, be questioned whether the real importance of a given subject is not shown less by the amount of talk to which it may give rise, than by the amount spent upon it in the production of an article the best fitted to meet advancing requirements.

The amount of brain-power and hand-labour expended for many years past in invention and experiment for the production of a perfect water-waste preventer and regulator, and an unexceptionable water-closet apparatus, is alone sufficient to testify to the paramount importance of investigation into the proper principles to be followed in their construction, with the view of arriving at some intelligible lines within which they should be restrained.

To all who have taken an active interest in sanitary matters, nothing can have been more evident than the dangers attending the old system of pans and valves, with D traps fixed out of sight, inside the house. At the annual meeting of the Parkes Museum, Sir William Jenner spoke of these last in no polite or measured terms. And truly the terms used by him were not exagerated. But the difficulties attending the amendment of an established state of things with the British citizen are almost insurmountable, especially if it be such as to touch his inner man, whether through his pocket, or (if there be one) some equally tender point. And unquestionably there are vast commercial interests which stand in the way. So far as we can be judged by outward appearances, under the present state of things even the value of the great bulk of house property is but little affected by the presence of sanitary or unsanitary arrangement in these respects. On a recent occasion in a house in which I have sojourned, and in which there has been constant ailment with one or more of the inmates,—to say nothing of several cases of blood-poisoning attributed by the medical attendant to sewer-gas,—I have endeavoured in vain to induce the landlord to provide a water service for domestic purposes, apart from the only one which is supplied from a cistern over the water-closet, this closet being served by the customary spindle valve, with water-box, which inevitably releases the bad air from beneath into the water at the bottom of the cistern. I appealed to him, further, to remove and to ventilate the decayed and constantly leaking lead soil-pipe (occasionally eaten through by rats from the drain), which runs down inside the house, adjoining one of the sitting-rooms, leaving it in an almost chronic state of stench. And, more than this, I appealed to the sanitary inspector, but could get no redress in these matters. This landlord, being also the agent of an enormous house-property, was imperturbable alike under threats of quitting and under appeals to authority. There is every reason to fear that such is no uncommon case. And in the great mass of speculative building hitherto, a few pounds per house of additional outlay, in these respects, has not been considered remunerative by way of investment. The houses must be had, and are often occupied almost before they are properly completed, irrespectively of these trivial considerations, about which it is said meddling people make so much fuss. People have become habituated to it. No death in their families has been traced to such causes. Almost all houses are alike in these respects. There is but little choice, and other occupants have lived on without complaining. Surely there cannot be so very much the matter, or we should hear more about it, and we can only go on as others do, and if we tried to examine into the matter ourselves, we should be no wiser. We must take what we can get, and either grumble or be thankful as the case may be. This, I venture to say, without exaggeration, is the prevailing state of feeling, and mode of action, or rather inaction, in these matters.

The remedies usually proposed for this state of things are, first, legislation for the enforcement of sanitary conditions; secondly, the education of the masses to understand and appreciate their own true interests, and to insist upon these being respected. Excellent remedies in their way, and they will doubtless effect much. But the difficulty of a general

* From a paper by Mr. William White, F.S.A., architect, read at the Exeter Sanitary Congress.

application of them meets us at every point. The great precedent remedy must be looked for mainly in the production of satisfactory sanitary apparatus and appliances, of the greatest simplicity, and at the most moderate cost; and then at imparting information respecting their principle, and their practical application, to the more educated classes of persons, and to those through whom such appliances are brought into use, rather than in any amount of crusade against mere recklessness, ignorance, or prejudice.

Let me now endeavour to give effect to the foregoing remarks by a few practical considerations as to water-closet construction. I would, in the first place, deprecate the use of all closets by which, on the pulling up a handle, the contents are dropped down by means of the withdrawal of a plug, valve, or pan, whether into a trap, or directly into the soil-pipe and drain itself. Apart from valves and plugs being liable to derangement, it is evidently possible, and in many instances of accidental deficiency of water extremely probable, that they may be used without water, to the great danger of corroding the pipes and choking the drains. Secondly, I would eschew everything but some description of hopper-basin or flushing-pan. The contents of these cannot be let down, to the great danger of soil-pipes and drains. In case of the water service failing, or being frozen up, or otherwise deranged, a pail of water poured down will carry everything away safely. Thirdly, I would have the best possible flush of water which can be obtained by a regulator or waste-preventer, constructed without any valve, except only the ball-valve which supplies the "feed" or serving cistern. Fourthly, I would, in all cases, insist upon the use of this feed-cistern, or other intermediate receptacle, for cutting off completely all contact between the closet and the main service, or house-cistern, which may then be placed at any convenient distance from the closet, whilst affording the opportunity of regulating accurately the amount of water to be used for each discharge. Fifthly, I would avoid all traps except the one which is formed in the construction of the hopper-basin; this being made to flow out into a ventilated or open soil-pipe, which, again may be carried up within an external ventilated flue, for protection from frost, or for carrying off the foul air more effectually. There have been several inventions which I cannot regard as wholly satisfactory, with a system of flushing which merely washes out the contents of the basin into the trap below, in which the contents commonly are only partially concealed, and which does not clear itself properly with any ordinary flush of water which can be let in upon it. They are, however, a wonderful improvement upon previous descriptions of hopper-basins, and of still greater value as aiding in the superseding of closet valves and pans. The old hopper-basin has in the main worked far better than these; but the small stream of water, through an insufficient nozzle, has been quite ineffectual for its proper cleansing. The "Shrewsbury" patent basin, made by F. Peirce & Co., is calculated to meet most of these objections. But invention has been rife in the direction of the valveless waste-preventers for the flushing of closets in the manner which I have indicated. Of these Hailstone's patent and Braithwaite's patent appear to be excellent, if the stream discharged be sufficient. The water is discharged through a syphon, which is set going, in the one case by immersing a block of terra cotta, to raise the water to a sufficient height to fill the syphon; in the other, by raising a small quantity of the water in a cylinder. By the Shrewsbury patent the result is produced by the mere process of lifting out of the regulator, or feed-cistern, the requisite quantity of water in a pan or tray, and so tipping it into a funnel, thus securing the sudden and effectual flush which is required for the specially-formed basin or pan. It surely is to the fulfilment of such conditions as these that all our efforts must be turned, and the stream of invention directed, as, indeed, latterly it has been to a great extent. If there are principles in closet construction radically wrong and bad, and there are others which are essentially true and good, it is only by thoroughly sifting the one and the other that just conclusions can be arrived at, and advancement made. I have not been advancing theories without giving, as I conceive, good and sufficient reasons for the general principles which ought invariably to be followed. Let them be well weighed, and if they cannot be defended, let them be amended. Whether they be accepted as good and true or not, I cannot, I am sorry to say, conceal from myself the fact that they are not likely to be generally carried out, at all events for a long time to come, even with the most strenuous efforts of sanitarians to enforce them, either by precept or by law. The present state of things has too firm a hold on the people at large, and there are commercial principles at stake which will greatly stand in the way of such a general improvement.

I am not one to advocate interference with personal rights or vested interests, and I may therefore state freely what I believe to be the almost insurmountable difficulty attending it, even supposing a general agreement as to this system being the best. The best and largest firms necessarily live by advertising. And enormous is the good which they have effected by spreading the knowledge of improvements. Advertising is the only means by which such things can be brought before the public; and that which will pay, and will meet the public requirement, howsoever bad in principle it may be shown to be, must not be omitted from the catalogue of the useful articles supplied. The good and the bad are *equally set forth, side by side*. The generality of people take the recommendation of a thing in this manner, and are only too glad to take what is thus brought before them, without further trouble or question. And so long as the great variety of opinion upon these matters exists amongst those who are supposed to be well informed, it is not to be wondered at that so little real result should be obtained. With all this, however, we are far in advance of our Continental neighbours. At Berlin, and at Rotterdam, they rest content, as it was described to me a few weeks since by well-informed persons, with merely a pan and a tap; and nothing could be more simple. At Dresden, Hanover, Bremen, and Hamburg, much more attention is now being paid to these mundane things; but one's reminiscences of Continental sanitation are by no means pleasant. I am not at all sure that the same remarks might not be made by a casual observer, as to the state of the case in our own country; for, as yet, I fear, we are, after all, but little in advance of them, and that typhoid fever, certain skin diseases, and much general debility and ill-health, will continue to be, as now, but too common; for up to the present time all that has been written and said by our most eminent physicians and sanitarians seems to have made but little practical impression on the educated, the heads of families, and house-owners generally.

RE-ARRANGEMENT OF MONUMENT YARD.

NEW BUILDINGS AND THOROUGHFARES.

The entire area of Monument-yard is at present being re-arranged, and so laid out as to convert a large portion of it into a new carriage-way, which is intended to be constructed between Fish-street-hill and Lower Thames-street, opposite Billingsgate Market. Hitherto the whole open space around the Monument has been flagged, and served only as an approach to the Monument itself and the buildings on the north, south, and east sides respectively, with the exception of a narrow passage at the south-east corner, leading into Pudding-lane. All this is now being changed. The old flags have been taken up, and the level considerably lowered, with the view of adapting it to the gradient of the intended new thoroughfare. There are to be new footpaths on the north and south sides of the Monument, with carriage-road approaches to the new thoroughfare eastward, which will intersect Pudding-lane, buildings there having been taken down for the purpose of opening out the new street. The new carriage-road around the Monument will be paved with granite, resting on a concrete bottom. It may be interesting to add that in making some necessary excavations for the new roadway, an old crypt was opened out at several feet below the level of the yard, in close proximity to the Monument. The old buildings on the north and south sides of the Monument, fronting Fish-street-hill, have recently been taken down, and on the site so cleared on the south side an extensive block of new buildings is in course of erection, which will have a frontage to Fish-street-hill of about 40 ft. in length, and be carried to a depth of 70 ft. eastward, the Fish-street-hill elevation, as well as that facing the south side of Monument-yard, being uniform in architectural design. The ground floor of the two frontages will consist of seven shops, five of which will be in the Monument-yard frontage, and two in Fish-street-hill. The building, which will be carried to a height of between 65 ft. and 70 ft., will have ornamental frontages in Portland stone and polished granite. The upper floors will consist of offices. Mr. W. Smith, of Gresham-buildings, is the architect; and Messrs. Lark & Son, of Fore-street, E.C., are the contractors. The site which has been cleared on the north side of the Monument in Fish-street-hill remains inclosed and not yet built upon. It belongs to the Fishmongers' Company, who, we learn, do not propose to erect any new buildings upon it until the Inner Circle Completion Railway project is finally settled.

THE PATENT LAWS.

In the Economy and Trade Department of the Edinburgh Social Science Congress, on the 11th inst., Sir U. J. Kay-Shuttleworth in the chair, the question set down for discussion was "The Effects of Patents on Science, Capital, and Labour."

The Rev. S. A. Steinthal, secretary, in the absence of its author, Mr. John Standfield, London, read a paper on the subject, in which the writer asserted that the three things which most required protection were science, capital, and labour. It was evidently our interest, he submitted, to afford inventors all the scope we possibly could, so that our trade and income might increase and our expenditure diminish. Contending that we had legislated so badly with regard to the development of science that the value of both capital and labour had been kept considerably below what it would otherwise have been, he remarked that the prosperity of a nation depended upon its scientific progress,—using these words in a wide sense to embrace all discoveries and improvements in our numerous and varied industries,—that scientific progress, in its turn, depended upon invention, and that the inventions of a nation were practically dependent upon its patent law. This was, perhaps, more particularly the case in this country than in any other. In the United States, a patent was granted for seventeen years, after careful examination by experts, for the small sum of 7*l.*; whereas a patent in this country was burdened with the heavy stamp-duties of 175*l.*, and was not subject to any examination. This enormous difference handicapped the British inventor by twenty-five to one in favour of the American, and thus, taking the average of the last ten years, there were 13,356 patents granted in the United States against 3,030 in this country. Mr. Standfield accordingly proposed that our stamp-duties should be so reduced that a patent in this country could be obtained as cheaply as in America. His proposal is to charge a stamp-duty of 2*l.* on application for a patent, and a further duty of 3*l.* when the patent is granted, and an annual stamp-duty of 1*l.*, 2*l.*, or even 3*l.*, so that the Patent Office may be more than self-supporting. He also proposes that patents should last twenty-one years, including provisional protection for one year.

Mr. E. J. Watherston said it was to be feared the Britisher was most unfairly handicapped in competition with foreigners. Most unwisely England omitted to raise up those sensible barricades of national and technical education; and farther, she failed to get rid of the "dead hand," the insane laws of our ancestors, by which many of our trades were sought to be governed. Thus it was that an excise was still to be found upon trade, in the shape of an oppressive tax upon "inventions." How foolish, he said, it seemed to be to fetter trades by so monstrous a charge for a simple patent as 175*l.*—a prohibitory charge, especially when a similar patent in the country that entered more closely into competition with us than any other cost but 7*l.*, and was shortly to be reduced to 5*l.* He maintained that, if it were desired to discover how not to encourage manufactures in this country, and to encourage imports at the expense and to the detriment of our manufacturers, an important factor might be found in our senseless patent laws. He held that we wanted a Minister of Commerce, whose duty it should be to relieve trades from all hindrances to progress, to let trades and manufactures be free, and, above all, to get rid as soon as possible of the shackles and hobbles upon inventors' brains.

Mr. R. A. Macfie opposed licence duty for patents, on the ground that it granted a monopoly, and that every monopoly was an impediment to trade and manufactures.

Professor Heinemann, London, opposed the abolition of patent duty, on the ground that it would discourage invention. He did not think the American system would do here.

Mr. Westgarth, London, contended that our patent duties were the greatest possible hindrance to invention. He did not, however, agree with the American system, but he regarded our present patent system as most gross and unjust. The Government should take in hand the training and restraining of inventors, should regulate the patent fees, and give the patent right to every applicant subject to those fees.

NEW MISSION-HALL, KILBURN-LANE.

The Queen's Park Hall, adjoining Queen's Park estate, was opened last week. The new building, the foundations of which were begun just three months since, comprises a hall 50 ft. long by 28 ft. wide, approached from Kilburn-lane through a side porch. The roof, which is lofty, and rests on stone corbels, is open-timbered, stained and varnished, and has a light and graceful appearance. The windows are constructed for ventilation, and are fitted with obscured plate-glass. The walls are painted a light violet, with a plinth 5 ft. high, of deep red. The platform is raised a few steps from the floor level, and has a moulded front and balustrade with massive polished mahogany handrail, the desk being raised and panelled in front. The doorways at each side of the platform lead to the inquiry and retiring room, with a lavatory, &c., conveniently placed in the rear, also to a room fitted up with boiler and other requisites for tea meetings. The seats in the large hall are of pine, stained and varnished, the ironwork (like the gas-fittings and straps, &c., of roof-timbers) are painted blue. The hall will seat upwards of 300 people with ease, a larger number being accommodated if necessary. The buildings, including heating, lighting, water-service, drains, seats, and all other matters, have been provided for the sum of 810*l*. The contractors, Messrs. Hook & Oldrey, Cowley Wharf, Kensal Green, have done the work in a substantial manner within the short space of three months. The architect is Mr. Heffer, of Victoria-road, Kilburn, who designed the Albert Memorial at Hastings, the Mission Hall, New Ferry, and other public works.

SALE OF BUILDERS' WORKS, AND THIRTEEN ADJOINING HOUSES.

At the Auction Mart, on Tuesday, Messrs. F. Lewis & Co. offered for sale the extensive business premises, situated in Palace-road, Lambeth, facing St. Thomas's Hospital, which for several years past have been in the occupation of Messrs. G. Baker & Sons, builders and contractors. There was a large attendance at the sale, including several persons connected with the building trade. The premises occupy upwards of an acre in extent, and comprise several buildings, including large offices, deal-shed, saw-mill, joiner's shop, engine and boiler house, large engineers' and fitters' shops, 192 ft. long, and 40 ft. wide; three drying-sheds, with stabling for fifteen horses, and general stores. The steam power for driving the working machinery of the establishment was described as consisting of 16-horse power vertical engine, with a 60-horse power Cornish boiler. Included in the sale were likewise four gate-houses, in Palace-road and Paris-street, suitable for manager, clerks, and foreman, estimated together to be worth 145*l*. per annum. The property was stated to be held upon lease for a term of sixty-five years from June, 1844, at a ground-rent of 375*l*. per annum, and estimated to be of the net annual value, after deducting ground-rent, of 469*l*. The first offer made for the property was 3,000*l*., and by advances of 100*l*. at each bidding it was brought up to 3,800*l*., at which it was sold, it being stated in the room that it had been purchased by a firm connected with the building trade, by whom it would in future be carried on.

The several dwelling-houses in Palace-road were offered in thirteen lots. They were stated to be held on lease for a term of seventy-seven years from June, 1831, at an aggregate ground-rent of 115*l*., the ground-rent of each house being 9*l*. a year, with the exception of one of the houses, the ground-rent of which was 7*l*. a year. The rents of the several houses, all of which are let on yearly tenancies, range from 41*l*. to 46*l*. a year each, the aggregate annual rental being 531*l*. 4*s*. They realised prices varying from 460*l*. to 570*l*. each, fetching altogether 6,136*l*., the total amount realised by the whole of the property, including the builders' business premises, being 9,936*l*.

DEEDS AND TITLES OF LAND.

Sir Robert R. Torrens read a paper before the Jurisprudence Department of the Social Science Congress at Edinburgh, on the 8th inst., on the question, "Is it expedient that there should be one system of registration of deeds or of titles of land for the United Kingdom, on the basis of the system presently in operation in Scotland or on any other?" He said the benefits of the system in Australia had been that, through its operation, a saving of 19*s*. in the pound sterling had been effected in the cost of conveyancing. The wealth of the community had been increased by restoring to its intrinsic value as building sites land which, deprived of that special character by imperfect evidence and technical defects in title, lay waste and unprofitable. In answering the question how it came to pass that hitherto all attempts to apply this system to the lands of this country had completely failed, though taken in hand by three Lord Chancellors, he stated that the permissive use of deeds granted under the 63rd section of Lord Westbury's Act involved a combination of two incompatible principles,—"registration of deeds" and "registration of titles,"—producing a hybrid, unworkable measure. Lord Currie's Act was to some extent open to the same objections; but even if free from other defects, the result of giving nominally to the proprietor, but practically to his solicitor, the option to place land under the system, and the power to withdraw it again from that system, was in itself sufficient to ensure its failure, as had been demonstrated in the case of the Irish Act. It would be difficult, not to say impossible, to imagine conditions more favourable for introducing the system of conveyancing by registration of titles than those which existed in Ireland. But, unfortunately, the legal gentlemen who undertook to revise his Bill of 1863, preparatory to its re-introduction in the following session, deemed it politic, in order to propitiate Lord Westbury, and induce him to undertake the carriage of it through the House of Lords, to import into it certain provisions of his own measure, which were antagonistic to the principle of registration of titles, and his remonstrances were ignored.

Mr. R. Denny Urlin, of the Middle Temple, barrister, F.S.S., next read a paper on the same subject, in which he stated that the system of registration of title has several distinct advantages of its own; and it has been tried, though under heavy disadvantages, both in England and Ireland. Professional dislike led to the virtual rejection of a measure which was only optional; and only a few hundred titles are on the record of ownership. Still, the problem has been solved; for contracts can be made and completed within an hour, and dealings with the few estates on the record are enormously simplified.

NEW PUBLIC BATHS FOR LONGTON.

The foundation-stone of new public baths for Longton, Staffordshire, was laid on the 7th inst. by the mayor (Mr. George Bennion). The buildings are being erected on a site belonging to the Corporation, situated near the railway station, from plans prepared by Mr. Arden Hardwicke, C.E., the borough engineer, there apparently being ample provision made to insure convenience of arrangement in the many requisite sections of the building. While disposed not to lavish money in mere ornamentation, the Corporation wisely determined that the new baths should not be altogether devoid of exterior ornament. The style of the building is Gothic. There will be two main entrances, one for ladies and one for gentlemen, with a central ticket-office. The section devoted to gentlemen's warm baths will contain a number of both warm and vapour baths, and will have a large waiting-room attached. The dimensions of this part of the building are 38 ft. by 22 ft. There will also be a second-class bath-room, 30 ft. by 20 ft.; and it will be fitted up with eight baths. Provision is made for three swimming-baths, two for gentlemen and one for ladies. The first-class bath will be 70 ft. long by 30 ft. wide. It will be lined with white glazed bricks, fitted up with good dressing-apartments, and have a gallery, a diving platform being also provided at the deep-water end. The second-class swimming-bath will be of smaller area, 56 ft. by 30 ft., and it will be fitted up with all necessary conveniences. The ladies' swimming-bath will be 22 ft. by 17 ft.; and will be well fitted up, suitable dressing-rooms being provided. The roofs of the swimming-baths will be lighted from above by Shelley's patent system of glazing. Warm baths for ladies will be provided, and will be approached from the left of the entrance to the ladies' section of the building, and branching from the main entrance on their side. A waiting-room will be attached, and the baths will be of two classes, warm and vapour. The general Turkish baths will be on the first floor, over the ladies' section of the building, and will be suitably divided into compartments, the heating being done by a convoluted stove placed in the basement. The boiler-house will be situated in the rear of the main building, and will contain two powerful boilers, while the laundry will be fitted up with a six-horse power engine and have all requisite washing-machinery. The general work in this department will be done by Messrs. Bradford & Co., of Salford, under contract, for 750*l*. The tank-room is situated above the laundry, and will contain three large tanks. The superintendent's apartments will be on the first floor; and will be convenient in arrangement and fitting up. The builders are Messrs. H. & R. Inskip, of Longton, the amount of whose contract is 5,900*l*.

CHRISTMAS CARDS COMPETITION.

The offer of 500*l*., in fourteen premiums, made by Mr. Raphael Tuck for the best designs for Christmas and New Year cards, and the evidences of good faith given by the appointment of three well-respected artists as judges, led to the submission of a large number of designs; 925 frames are hung in the Dudley Gallery, many of them containing four designs each, and the large majority exhibiting a fair degree of skill. The decision has just now been announced, and it will be seen that the ladies have carried all before them, having taken eleven out of the fourteen prizes. The following is the list:—First prize, 100*l*., Alice Squires; second, 75*l*., Herbert Allchin; third, two of 50*l*. each, Harriet M. Bennet and Patty Townsend; fourth, five of 25*l*. each, Ellen J. Miles, Mary S. Story, R. J. Abraham, Mrs. Koberwein Terrell, and Rebecca Coleman; fifth, five of 20*l*. each, Marian Croft, Miss Balfour, Elizabeth B. Bayley, Geo. Clausen, and Kate Sadler.

THE BIRKDALE SEWERAGE WORKS.

The Birkdale Sewerage Works, which have been in course of construction since 1875, have just been formally opened by Mr. F. Hillé, the inventor and patentee of the system.

The Local Board did not determine upon Mr. Hillé's system before they had visited various towns where different ones were in operation, and were convinced that it was suitable. It was shown at the time that at Edmonton, at Tottenham, Windsor, and other towns, the process worked satisfactorily. The system consists mainly of two parts,—first, chemical treatment; and, secondly, filtration either artificial or through land. Chemical treatment has for its object the precipitation of all the suspended matter contained in the sewage and of whatever smaller proportion of the matter is held in solution. The liquid resulting from chemical treatment, commonly known as the effluent, is either discharged directly into the river or sea, or it is turned upon land for further purification. Where there are large rivers the effluent may be discharged directly from the depositing-tanks; but in the case of simple watercourses or streams chemical treatment is always desirable, so that the treated sewage may in no way be injurious either to vegetable or animal life.

The Birkdale Sewerage Works are situated at the top of Aughton-road, at the junction of the latter with Chatham-road. The sewage enters the works through screening-chambers, and from them into an underground reservoir, which will hold 500,000 gallons of sewage. From this

reservoir the sewage is conducted into a pumping-well, where it receives the chemicals, and is lifted by two ten-horse power engines into two depositing-tanks with a capacity of 370,000 gallons. From the depositing-tanks, after precipitation has taken place, the effluent, or purified sewage, passes on to filter-beds an acre and three-quarters in extent, which are divided into five separate beds that will be used in rotation, so as to insure complete aëration or oxydation. Previously to the chemicals being sent into the pumping-well they are mixed in the mixing-pan, whence they are delivered into two mixing-cylinders fitted with agitators, and thence pass into the well named. All the treated sewage before being discharged into the brook is passed over the filtering-beds. The extent of the ground covered by the sewerage works approaches five acres. The engineer is Mr. Fairbairn.

SMOKELESS TOWNS.

Sir,—May I offer a suggestion? To prevent the smoke of domestic coal poisoning the atmosphere is very desirable, and I venture to submit to you that any row of houses might be so altered as to the chimney outlet, although new streets built to this plan would be much better, that all the smoke could enter a common flue leading to an exhausting fan and a fire. The fan should be so constructed as to compel all the smoke arriving at that end of the horizontal flue to pass through a furnace and be destroyed. An engine would be required to work the fan, which might be utilised in another manner, namely, supplying the electric light to all the houses. Large blocks of workmen's dwellings might be easily constructed on this plan, and the common flue might be so arranged as to give warmth to the building. This would effectually cure smoky chimneys, and would also ventilate every room wherein a grate was placed, if the inlet of the chimney remained open. The fire would also be useful if made to consume vegetable refuse, and possibly many other valuable services could be found for it. Of course the furnace would be fed with a smokeless coal so as not to be in itself a nuisance, and the engine could supply power to the houses for coal-lifts, dinner-lifts, &c.

Sunshine.

HOW PARISH AWARDS ARE TAKEN CARE OF.

Sir,—Whilst engaged in surveying an estate, the other day, we had occasion to refer to the parish award, and accordingly sought out the clerk, to gain admission to the church, expecting to find the award there. He, however, informed us that the parson had it at the Vicarage. We therefore called on the worthy vicar, who most affably produced the award, and said he regretted he could not show us the plan which should accompany it, as he had lent the same for a few days to a man at the other end of the village, to make a tracing of it. Bidding the vicar "Good day," we went in search of the plan, which we found at the house of the man to whom it had been lent, *nailed* to a table, to enable him to make his tracing. The plan was evidently a most carefully prepared one, and certainly deserved better treatment.

Surely such plans and awards should be kept with more care, and as far as possible free from the danger of fire, &c., and not be lent promiscuously to any one who may think fit to borrow and take them off the premises of the person who has charge of them.

Maughan & Cuxson.

A HINT TO THE MIDLAND RAILWAY COMPANY.

Sir,—In a recent article in the *Builder*, headed "The Wreck of the Scotch Express," it is stated, "The London and North-Western, the Great Northern, and Midland Railways have twelve tracks of rails for more than twenty miles out of London," but although the two former have four tracks each out of London, the Midland Company have only two, making a total of ten instead of twelve. The travelling public have a very great deal to thank the Midland Railway Company for, and I have often been surprised that the Company do not do more for their local traffic between Luton and St. Alban's and London than they have done. If four tracks of rails were laid down as far as Luton or Bedford, it would give the Company a chance to keep their local trains more punctual, for it is a notorious fact that scarcely any of their local trains from Luton to London are ever in proper time, especially those in the early morning, which are used largely by business men. At several places down their line some large plots of building land have recently come into the market, and the Midland Railway Company would reap a great deal of benefit if they provided punctual accommodation to London from Luton and St. Alban's in the morning.

A Traveller.

ROAD FORMATION AND STREET PAVEMENTS.

Sir,—As the patentee of the asphaltic wood pavement referred to in your issue of the 9th inst., and in the letter signed "Fact," I trust you will allow me to point out that your latter correspondent might have stated his "facts" more clearly, at least one of them being misstated. In order to correct which, I may say that I am informed the Asphaltic Wood Pavement Company have laid in London over 85,000 yards on that system, and, I believe, 35,000 yards is a near approximation to that laid on Henson's system, making a total of about 120,000 yards on those systems, and not 10,000 yards, as stated by "Fact"; thus showing the opinion of the authorities, though in a different manner to that he conveyed. This will be more evident when it is known that of the 200,000 yards, which I will take as correctly representing the quantity of wood pavement laid direct on concrete, a very large proportion (I believe, about 150,000 yards) was originally laid by the Improved Wood Pavement Company on their plank system, which has proved such a costly and utter failure as to rapidly require entire renewal; and, therefore, they have under their maintenance contracts relaid the greater part with wood blocks placed direct on concrete.

Now, as to the "fanciful bedding of felt or asphalte." It is acknowledged that the foundation forms the true road, the surface blocks in all systems being a mere covering to afford a foothold, and protect the foundation from the impact of, and loss by attrition from, the traffic. We have also to deal with the following facts, which do not seem to be clearly appreciated by your correspondent of last week:—1st. That the disintegration of the foundation in wood, as well as stone pavements, is due to the direct pounding action of detached or imperfectly connected blocks, assisted by the access of surface water. 2nd. That the cost of wood pavements is largely influenced by the proportion of timber employed, and as the price of suitable timber will continue to rise with an increased demand,—the supply being limited,—such pavement as requires the smallest proportion in original construction and renewals will always be the cheapest. The asphaltic wood pavement was designed entirely with a view to meet those conditions, and by the adoption of the impervious layer of asphalte the concrete is thoroughly protected from surface water, a less depth of foundation is thereby required, still retaining equal solidity. As regards economy in timber,—with wood paving generally, as with stone, a deep block is essential to stability; but in the above system the blocks are firmly held down to the asphalte layer, and agglutinated to each other by the asphalte, which is run half-way up the joints, and also enters the auger-holes, which should in all cases be bored in each, thus producing a compact parquet-like slab, extending from curb to curb, the strains from passing loads being in turn shared by neighbouring blocks, and transmitted to a largely-extended area of foundation, the result being that, whereas in other systems the block requires renewal when worn to within about 4 in. in depth, it is possible with the asphaltic wood pavement to wear them to within 2 in., or even 1½ in. of the base, without impairing their solidity. Blocks at least 2 in. shallower than are now employed in this country are thus sufficient for the requirements of the traffic.

The above are "*not the assertions made by any theoretical problems, but the actual experience*" obtained with the pavement, as laid over five years, under my foreign patents, in the streets of a Continental seaport town, over which a traffic passes from the shipping equal to the traffic of most average London thoroughfares. The following was the section:—concrete, 4½ in.; asphalte, ½ in.; sound red pine blocks, 3½ in. deep and 7 in. by 2½ in. on the surface, each block having two auger-holes bored to the depth of ½ in. near the base. The joints were run up half-way with heated asphalte, the remainder coarsely grouted. It has been in constant use to the present without repair, and is still in good condition, though the adjacent stone pitching has been thrice re-laid in the interval. The same section has been over twelve months in use for tramway traffic, and at the same time blocks only 2½ in. deep with ½ in. asphalte and 3 in. of concrete, were laid for light street traffic similar to that of most London squares. Both are in excellent condition, and there is every reason to expect continued good results.

It is unnecessary to remark that in this country the above sections should suffice for similar conditions of traffic, &c. That for very heavy traffic the depth of block need not exceed 4 in., with ½ in. of asphalte and 5 in. of concrete. That, far from being costly, all are cheaper than that advocated by "Fact," while retaining equal durability. Also, that the first cost of the shallower section is but little in excess of good macadam, whereas the annual cost of maintenance and cleansing would be considerably less.

In conclusion, I may add that it is evident from the facts I have adduced, an unnecessary quantity of concrete is required on the system advocated by your correspondent, and an average of about 30 per cent. of timber wasted, which might be saved by the judicious use of asphaltic wood pavement. That the cost of wood pavement is, therefore, generally about 2s. per square yard higher than is necessary for equal durability. And that, notwithstanding "Fact's" assertion that the asphaltic wood pavement is costly, it is capable of even more economic results than those contained in the table of your correspondent, to which he takes objection; for if the sections indicated above were generally adopted, a saving to the ratepayers of about 14 per cent. in the present cost of wood pavement would be effected, and for every three miles now paved with a given quantity of timber, about four miles could be paved in an equally serviceable manner.

Henry S. Copland, C.E.

Balsall Heath.—The new Church of St. Thomas-in-the-Moor, Balsall Heath, has just had its east window filled with stained glass. The principal subject, occupying three lights, is the Ascension. There are two minor subjects: on the right our Lord restores to health Peter's wife's mother, and on the left He gives sight to the blind. The window has been erected in memory of Mr Edward Townsend Cox and his wife, by their son, Mr. W. Sands Cox. It was designed and executed by Messrs. Camm Bros., of Smethwick.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The first ordinary meeting of the new session will be held on Monday evening next, the 1st of November.

The usual certificates will be presented to Messrs. Gass, Goldsmith, Johnson, Kemp, Marvin, and Summers, passed candidates in the class of proficiency at the voluntary architectural examination, 1880. Afterwards the opening address of the session will be delivered by Mr. John Whichcord, F.S.A., president.

A special general meeting of members only will be held at the close of the ordinary meeting to elect an honorary secretary in place of the late Mr. Thomas Henry Wyatt, and Mr. John Macvicar Anderson, member of council, will be proposed as a fit and proper person to fill the office.

A voluntary examination in the class of proficiency will be held on the 14th, 15th, 16th, and 17th of June, 1881. All candidates will be required to go through the examination, as a whole, in both the scientific and artistic sections; but those who have previously passed in one section will be permitted in 1881 to offer themselves for examination in the other section.

CHURCH-BUILDING NEWS.

Swymbridge.—The parish church of Swymbridge, near Barnstaple, was re-opened on the 21st ult., after restoration. The church consists of nave, chancel, north and south aisles, south chancel aisle, north transept, vestry, with priests' chamber over it, porch, and tower containing a peal of five bells. The church dates from about 1460, with the exception of the tower, which is fourteenth-century work. Before the restoration an unsightly gallery crossed the west end of the church, completely blocking up the arch opening into the tower; this has been removed. The font has been removed from the second pillar on the north side to its present position, and the paint has been taken off, thereby showing the carving more plainly. The pulpit occupies the same place as formerly. The whole of the nave, aisles, chancel, and transept were blocked up with old-fashioned deal pews. These have been removed, and open sittings have taken their place. The bench-ends are carved after the pattern of the old ones, some of which were found doing duty as props to the deal seats. The old carved bench-ends that were found have been put together again, and once more occupy their proper position. The tiles in the chancel are encaustic, supplied by Godwin, of Lugwardine. When the plaster was removed from the east-end wall of the transept, a piscina was laid bare, believed to have been that of a chapel dedicated to St. Bridget. The whole of the works have been carried out by Mr. Jonathan Marshall, of Plymouth, with the exception of the stalls in the chancel, which are the work of Mr. Robinson, London. The total cost of restoration (exclusive of the chancel, which is being done by the Ecclesiastical Commissioners) is 2,600*l.*

Chideock (*Dorset*).—On the 29th ult. the parish church of Chideock was re-opened, after restoration, which appears to have been much needed, the building having been allowed by neglect to get into a very dilapidated condition. Several of the heavy timbers in the south aisle roof were found to be completely rotten at the ends, and as soon as the lead was removed fell in of their own weight, showing that instead of supporting they were actually supported by the lead roofing, which, happily, was deeply embedded in the walls. The east and west walls of the transept were also very much decayed and out of the perpendicular, and an unsightly beam had been substituted for the transeptal arch. The restoration has included the removal of the gallery, the complete reparation of the belfry, the rebuilding of the north wall of the nave, and east and west walls of the transept, the insertion in the former of two new Perpendicular windows, the re-roofing, reflooring, and re-glazing of the entire church, covering the south aisle roof with new lead, laying a six-inch bed of concrete beneath the new wooden floor and providing for ventilation between the concrete and the wood, the building of the new transeptal, chancel, and side arches, with supporting buttress outside the south wall, fresh mortaring of the interior, and pointing and renewing the decayed stonework of the exterior, at a total cost of about 1,100*l.* The work has been done under

the direction of Mr. G. R. Crickmay, of Weymouth, the diocesan surveyor. One of Porritt's stoves has been adopted for heating purposes. Mr. Jno. Beer, of Wareham, has carried out the works. The stained-glass windows are by Messrs. Lavers, Barraud, & Westlake.

Banbury.—On the 29th ult. the new tower of Christ Church was dedicated by the Bishop of Oxford. The tower has been built, at a cost of 1,200*l.*, of Gibraltar stone, with dressings of Corsham Down Bath stone, and rises to a height of upwards of 80 ft. from the ground. The architects were Messrs. B. & E. B. Ferrey, of London, and the builder was Mr. Franklin, of Deddington.

Heythrop.—On the 28th ult. the Bishop of Oxford consecrated the new church just erected in Heythrop Park by Mr. Albert Brassey, the owner of the Heythrop Estate. The church, which is dedicated to St. Nicholas, consists of a nave and south aisle, with a tower forming a porch at the west end of the aisle, a chancel with an organ-chamber on the south, and a vestry on the north. It is built partly of the materials of the Roman Catholic chapel which formerly stood near the house, and partly of new stone from the quarry on the estate. Milton stone has been used where a material of finer and more even quality was required for carving, &c. The general dimensions of the building are as follow:—Nave, length 50 ft., width 22 ft. 4 in.; chancel, length 30 ft., width 20 ft.; height of tower, 94 ft. There is accommodation for from 180 to 190 persons. The roofs are of pitch pine throughout, and covered with Broseley tiles. The chancel and sanctuary are floored with a pavement of Italian marble mosaic by Messrs. Burke, of Newman-street. The stained glass in the east window is by Messrs. Burlison & Grylls, who have also executed the cartoon for the mosaic with which it is intended to fill the large panel over the altar; it is a representation of the Last Supper. The glazing, of three tints of cathedral glass, for the rest of the windows in the church is by Messrs. Brown & Boreham. The chancel seats, the altar, and pulpit, which are of oak and walnut, and the vestry screen of oak, were executed by the contractor, Mr. A. Groves, of Milton-under-Wychwood, who has carried out the whole of the works. The clerk of the works was Mr. Calloway, of Heythrop; and the foreman of works was Mr. Jos. Buckingham. The carving is by Mr. T. Earp, of Lambeth. In the tower are hung three bells by Mr. T. C. Lewis, of Brixton. The church is heated from a chamber under the vestry by Grundy's hot-air system. The style of the building is Decorated. The architect is Mr. A. W. Blomfield, M.A.

Rawtenstall.—In the Manchester Consistory Court, on the 1st inst., the Rev. James Norris, vicar of St. Mary's, Rawtenstall, applied for a faculty to take down the tower of the church, extend the church westward, increase the number of sittings, extend the chancel, construct a new vestry, and to make other alterations specified. It was stated that the cost of the proposed improvements would be 2,310*l.* A citation for the alterations was decreed.

Brynamman, Carmarthenshire.—The foundation-stone of the new church about to be built for the 200 seceders from the Welsh Congregationalists' communion was laid on the 7th inst. The new building will consist of a nave, 55 ft. by 25 ft., 18 ft. high to the plate, and 36 ft. to the ridge, the pitch-pine roof being open all the way up, and plastered between the rafters, the principals arched and supported on Bath stone moulded corbels; a chancel, 26 ft. by 16 ft., with arched, ribbed, and boarded ceiling; a vestry, with heating-vault below, and organ-chamber; also a porch, vestibule, and baptistery arranged side by side, forming a kind of narthex at the west end, which will have a suitable bell-turret above. The walls are to be built of local stone, with Westwood Ground dressings, and the roofs covered with grey Whitland Abbey slates. The pitch-pine seats will be of open description, on wooden platforms, the passages and chancels being laid with encaustic tiles. The whole outlay will be 1,500*l.*, the number of sittings provided being 300. The architect is Mr. E. H. Lingen-Barker; and the contractors are Messrs. Balcombe & Price, of Pembroke Dock.

Tamworth.—The committee for the restoration of St. Paul's Church have decided to get estimates from the architect, Mr. Basil Champneys, for the north and south-west windows, and for the three north aisle windows, and the preference has been given to local tradesmen.

Birmingham.—St. Asaph's Church, Birmingham, has been re-opened, after re-decoration by Mr. Heritage, of Marshall-street. The organ has been removed from the west gallery to the floor of the church, near the choir, and fifty-four pipes have been added to it.

Newcastle-on-Tyne.—It has been resolved to carry out certain alterations in St. Thomas's Church as soon as funds come in. It is intended to remove the present high pews, and to replace them by open oak seats, the cost of which, according to the tender of Mr. James Gibson, builder, will be 423*l.* It was also resolved to remove the glass from the great east window of the church, it being seriously out of repair, and to replace it by a new stained glass window, to commemorate the connexion of the Rev. Richd. Clayton with the church. The cost of the whole contemplated improvements is estimated at 950*l.* The work will be carried out under the direction of Mr. Arthur Gibson, architect.

Ipswich.—St. Clement's Church, Ipswich, was re-opened on the 7th inst., after alteration and redecoration. Altogether about 200*l.* has been spent, Messrs. J. B. & F. Bennett having done the builders' work, and Messrs. Stearn & Sons the painters' work.

Bathford.—The new tower of Bathford Church was opened on Michaelmas Day. It is the gift of Mr. H. D. Skrine, who some years ago built the north aisle. The former tower, built by Mr. Newman, the father of the builder of the present one, was of small dimensions, and intended to suit the conditions of low-pitched roofs, and a church of smaller area than the one since enlarged by the addition of a north aisle and other extensions with higher gabled roofs. The new tower is of much larger area on plan than that which it has displaced, and considerably higher, the style being that of the date of the chancel and other fragments of stonework discovered in taking down the old north wall of the nave, and which were of the Decorated period. The new tower consists of three stages in height of local freestone, the ornamentation being chiefly confined to the upper stage, which is pierced with large window-openings and crested by an open-work stone parapet with pinnacles at the angles, the south-west angle having a stone projecting staircase surmounted by a turret of considerably greater bulk and height than the other pinnacles, having a metal corona and weathercock on the summit of its spire. The tower is designed of sufficient height to allow of the nave roof being raised in the event of a clearstory being added. The former small bells have been exchanged for a new peal, furnished by Messrs. Warner & Sons, of London. On the west front is a canopied and crocketed niche containing a statue of St. Swithin, nearly life-size, and on the same front the arms and crest of the donor, Mr. H. D. Skrine. The carving and figure are by Boulton, of Cheltenham. The architect is Mr. Preedy, of London, who carried out the restorations of the church at two former periods. The builder is Mr. W. H. Newman, of Bathford.

DISSENTING CHURCH BUILDING NEWS.

Abergele.—A new Wesleyan chapel was opened here on the 26th ult. The architect was Mr. Richard Davies, Bangor, the contract being undertaken by Mr. James Copping, Abergele, for 2,600*l.* The new building, Renaissance in style, occupies a site at the junction of St. George's-road with Bridge-street, and provides accommodation for 500 worshippers. The entire cost of erection, &c., will not fall much short of 3,000*l.*

Low Fell.—The foundation-stone of a Primitive Methodist chapel and school was laid on the 25th ult. at Low Fell. The estimated cost of the building represented by the plans is 1,000*l.*, but it has been decided only to proceed with the chapel and the shell of the school at present, an arrangement which will only necessitate the expenditure of about 600*l.*

Wraysbury.—The Baptist chapel at Wraysbury has been re-opened, after alterations which have cost 450*l.* A tower and spire, in which is a three-faced clock, was the gift of Mr. Virgoe Buckland. Above the door in the tower is a bas-relief in terra cotta, by Tinworth, the subject being "The City of Refuge." This panel was the gift of Messrs. Doulton, of Lambeth.

Halifax.—St. John's Wesleyan Chapel, Halifax, which has cost 17,000*l.* or 18,000*l.* in erection, was opened on the 1st inst. The block of buildings comprises vestries and schools in rear of the chapel. On plan the chapel consists of a nave and aisles, without chancel. The principal front is to the north, and faces the junction of Prescott-street with St. John's-lane. The narthex, or porch, which is 12 ft. high, is entered by three arches springing from clustered columns. On either side is the octagonal base of the lofty pinnacles that form a leading feature in the design. A two-light window opens into the north side of each aisle. Over the heads of the arches to the porch runs a richly-decorated band of carved work. In the centre of the gable is placed the great seven-light window, its head filled in with rich tracery work of the Perpendicular period. A cluster of pinnacles finishes the gable end, and rises to a height of 50 ft. The two flanking pinnacles break into rich arcading after leaving the spring of the gable. They rise to a height of 57 ft., and are elaborately crocketed and carved. Internally the length is 77 ft. 4 in.; breadth, 50 ft. 8 in.; and height from floor to apex of roof, 42 ft. The aisles are divided from the nave by arcades of three bays each, the shafts being monoliths of polished Aberdeen granite, cylindrical in form, 8 ft. 3 in. in length, resting on octagonal bases of fine millstone grit, each base being 3 ft. 6 in. high. They stand clear of the seating. The spring of the transept arches is marked by the granite shaft being doubled, but each coupled shaft is in one piece. All the capitals are circular. The arches are equilateral. The span of each arch in the nave is 16 ft. 4 in. from centre to centre; while the transept arches are 24 ft. wide. Each of the eleven principals of the nave roof is filled in with Perpendicular tracery. The roofs to the aisles are sloped. All are in pitch pine, as are also the gallery fronts. The seats are low, open ones, with moulded tops. They are cushioned in dark crimson, supplied by Messrs. Jones & Willis, of Birmingham. Altogether there is accommodation for 800 or 900 worshippers. The windows are filled in with cathedral tinted glass. The gasfittings have been supplied by the Architectural Metal Works, Coventry. The pulpit is in Caen stone, octagonal in form, and richly worked upon every panel. It has been executed, from designs by the architect, by Messrs. Thompson, of Peterborough. The whole of the lofty wall space over the pulpit has been decorated in colour by Messrs. Powell, of London and Leeds. Neutral tints prevail. Five large recesses are formed, in four of which are inscribed the Lord's Prayer, the Creed, and the Commandments, the central space being filled up with a richly-floriated design. The wheel-window above has been filled in with stained glass, also by Messrs. Powell. The large openings in it are filled in respectively with the Calling of the infant Samuel, Solomon dedicating the Temple, our Lord blessing little children, and St. Paul preaching. The heating apparatus throughout chapel and schools has been supplied by Mr. Naylor. Mr. Henry Wilson has been the clerk of the works, and the following have been the contractors:—Mason, Mr. Jenkinson, Halifax; joiner, Mr. Townsend; plumber, Mr. Naylor; slater, Mr. Firth, West Parade; painters, Messrs. W. Lee & Son; ironwork, Messrs. Hirst Brothers. The architect is Mr. W. S. Barber, of Halifax. The organ in South Parade chapel is now in course of re-construction by Messrs. Forster & Andrews, of Hull, and will be placed in the new chapel in course of a few weeks. It is to be placed in a new case, designed by Mr. Barber, and the cost of its alterat on and extension will be 600*l.*

West Hartlepool.—A new Wesleyan Chapel has been commenced here. The site is at the corner of Frederick-street and Corporation-road. The design is semi-Gothic, and the structure will be of red brick with stone facings, the aggregate accommodation being for about 600 persons. The total cost is estimated at 850*l.* Mr. Garry, of West Hartlepool, is the architect, and Messrs. Curry & Tuke are the general contractors.

Hereford.—Memorial stones of the new Baptist Chapel in Commercial-road, Hereford, were laid on the 27th ult. Accommodation is to be provided on the ground-floor for 400 persons, and on the gallery-floor for an additional 250 persons, making a total of 650 sittings, for each of which 20 in. are allowed. The façade is to be executed in purpose-made white bricks with Beer (Devonshire) freestone dressings. The style of architecture adopted is Italian, treated with simplicity. The amount of the contract is 2,665*l.*, and the work is being carried out by Mr. William Bowers, of Hereford, under the superintendence of his foreman, Mr. Henry Williams, and the clerk of the works, Mr. Lloyd,

from the designs and under the direction of Mr. John Johnson and Mr. George Cowley Haddon, joint architects.

ROMAN CATHOLIC CHURCH BUILDING NEWS.

Maidstone.—The new Roman Catholic church in Week-street was opened for worship on the 4th inst. The plan consists of a nave with aisles at each side, about 60 ft. long, and together about 42 ft. wide, and a chancel, side chapel, organ chamber, and sacristy, 25 ft. long and together 40 ft. wide, the end of the chancel being apsidal. A tower, which forms one of the entrance porches, is attached to the western-most bay of the south aisle, and another porch at the west end of the north aisle. The style adopted is Geometrical Decorated, the building being constructed of red bricks, with Bath stone bands and dressings. The west end of nave contains a large four-light window, with deeply-recessed jambs. The tower has an entrance doorway, deeply recessed. Over this doorway is a recessed niche, in which is placed a statue of St. Francis of Assisi, the patron saint of the church. At a height of about 30 ft. from the ground, the tower, which is square to that height, is formed into an octagon-turret with bold broaches at the junctions; the spire springs from this turret, the total height being about 100 ft. The chancel is not yet erected. Internally the nave is separated from the aisles by lofty arcades of four arches each, springing from massive columns, with carved capitals, and the chancel arch and arches at each end of the aisles correspond. The roof is constructed of pitch pine throughout, and consists of raised tie-beam queen-post trusses, with arched braces and struts, and wall-pieces springing from stone corbels; it is match-boarded under the common rafters and collars, which boarding is perforated in ornamental patterns for ventilation, and formed into panels by moulded ribs placed over them. The floors of the passages, &c., are laid with Wilkinson's polished concrete, with Maw's glazed encaustic tile borders. The windows are glazed with cathedral glass of various tints, arranged in patterns. The altar and reredos are of Caen stone, of simple design. Mr. J. G. Naylar, of Rochester, has been the builder employed, and Mr. Boulton, of Cheltenham, has executed the carving, except the altar, which is the work of Messrs. Vaughan, of Maidstone. Mr. E. Hill has acted as clerk of the works, and Mr. Thomas Cramp as contractor's foreman. The buildings have been designed by and carried out under the superintendence of Mr. C. G. Wray, architect.

Salford.—The new Church of Our Lady of Mount Carmel, Oldfield-road, Salford, was opened on the 29th ult. The church has been built in the Early English style, Mr. S. Harrison, of Prestwich, being the architect, and Messrs. Healey & Sons the contractors. The building, the total length of which is 128 ft. by 42 ft., gives accommodation for 700 worshippers. The structure is of brick, with stone and terra-cotta facings.

New Brighton.—The foundation-stone of the Church of SS. Peter and Paul, to be erected at the corner of Hope-street and Rowson-street, New Brighton, was solemnly blessed on the 29th ult., by the Rev. Dr. Knight. The plans, which have been prepared by Mr. Edmund Kirby, architect, Liverpool, include nave, porch, gallery, chancel, side chapels, and sacristy. The length is about 85 ft., and the width about 35 ft. The style adopted is Early English, in brickwork, with stone dressings.

York.—The Lady-chapel of St. Wilfrid's Church has just been decorated, from the designs of Messrs. Goldie, Child, & Goldie, architects, London. The decorations have been executed by Mr. Knowles, ecclesiastical decorator, Stonegate.

Walton-le-Dale.—On the 10th inst. a new church at Walton-le-Dale was opened by the Rev. Dr. Hedley, O.S.B. It consists of nave, chancel, side-chapels, and aisles, and the style is that of the Early Decorated period. It is built with hollow walls, the inside being of bricks, the outside faced with Yorkshire parpoints. The whole of the dressings, both exterior and interior, are of Stourton stone. The total length is 96 ft., the width across nave and aisles 53 ft., and the height to ridge is 52 ft. It has been erected from the designs of Messrs. Pugin & Pugin, by Mr. W. Hothersall, contractor, of Preston. It will accommodate over 500 people. The amount of the contract, including benches, was 5,223*l*. The altar and marble floor in the chancel have been executed from the designs of the architects by Mr. Isaac Sherratt, sculptor, of Preston.

SCHOOL-BUILDING NEWS.

Plymouth.—The first portion of the new building of the Boys' High School in Ford Park, Plymouth, is approaching completion. The entire design comprises fifteen large class-rooms, each capable of accommodating twenty-seven boys; an assembly-hall, 40 ft. by 75 ft.; a library and headmaster's room, 40 ft. by 27 ft.; spacious principal and secondary stone staircases, board-room, assistant-masters' room, and pupils' day-room; commodious drill-shed, three excellent fives courts, and large workshops, or chemical laboratory; a residence for the headmaster, a serjeant's lodge, and a dining-hall with all necessary culinary offices. The portion now in progress contains eight class-rooms, six being to the north, and two to the south of the central front entrance; the library over the entrance-hall and the back wing containing the board-room, &c. Of this portion the central entrance-block and the two class-rooms to the south of it are as yet but slightly above the foundations. The principal front of the building faces the south-west, and consists of a central entrance projecting 4 ft., flanked by a two-storied façade containing twenty-four large mullioned and transomed windows, lighting twelve class-rooms. At the southern extremity will be the headmaster's residence, extending over a carriage archway, which unites it to the main building; and at the northern end will be the assembly-hall—standing at right angles—octagonal turrets rising up at the points of junction at both ends of the front, and also at the south-west angle of the assembly-hall. The external walls are faced with lime-stone and Portland stone throughout. The works are being executed by Messrs. Blatchford & Son, of Tavistock, under the superintendence of the architects, Messrs. Paull & Bonella, of London and Manchester. Mr. Siddell is clerk of the works.

Pinxton (Derbyshire).—New schools are in course of erection here. The ground-plan comprises a school-room 54 ft. by 25 ft. 6 in., with class-room 15 ft. by 15 ft., with two porches, affording accommodation for 200 children. The roofs are open, with framed principals, stained and varnished. The walls externally will be faced with common bricks, relieved with bands of stock bricks; also to arches of windows, weatherings to buttresses, &c., and internally with common bricks. The roof will be covered with Welsh slate and red Staffordshire ridge tiles. The cost of the work, exclusive of the fittings and boundary walls, is 550*l*. Mr. John Bird, of Pinxton, is the builder. Mr. John Lowe, of Manchester, is the architect.

Bilston.—The memorial-stones of a new Wesleyan Sunday and Day School building were laid on the 22nd ult. The school is to be a plain-built brick structure, 57 ft. by 26 ft. outside, and 33 ft. in height, the total cost of its erection being about 700*l*. Messrs. Hickman & Johnson are the builders.

Kimberley.—The foundation-stones of a Baptist School and Mission-room, in Victoria-street, Kimberley, have been laid. The school and mission-room will be a plain structure, and intended to accommodate about 100 persons. The buildings will be completed at a cost of 300*l*.

Ordsall.—On the 9th inst. the foundation-stone of new National Schools for the parish of St. Clement, Ordsall, was laid. The schools will cost 3,600*l*., of which sum Lord Egerton, of Tatton, gives 2,500*l*. Mr. Lord, of Manchester, is the architect.

Wolverhampton.—On the 16th inst. the corner-stone of the Wolverhampton new Blue-coat School was laid by the Hon. Mrs. Maclagan. The new buildings, which will cost 3,500*l*., were recently described in the *Builder* (see p. 340, *ante*). Mr. T. H. Fleeming, of Wolverhampton, is the architect, Mr. Lovatt being the builder.

Architecture in Modern Civilisation.—Among the lectures announced to be delivered during the approaching winter season at the London Institution is one on "The Prospects of Architecture in Modern Civilisation," by Mr. William Morris. The date fixed for this lecture is in March, 1881.

VARIORUM.

A REVISED edition of the "Ventilation of Dwelling-houses and the Utilisation of Waste Heat from Open Fire-places"; with a chapter on the "Country Parson's Grate," and other modern fire-places, by Frederick Edwards, junior, is about to be published by Messrs. Longmans, Green, & Co.——"Picturesque Europe" is getting towards its end. It improves with age. No. 54, just now published, treats of Belgium, and contains a number of illustrations which may justly be called beautiful. The letterpress of the part, by Mr. Percy Fitzgerald, is bright and pleasant.——Mr. Wyld, geographer to the Queen, of Charing-cross, will shortly publish an elaborate map of the gold fields and gold reefs of Southern India.——The *Garden* treats of every branch of its subject in the most thorough manner, and is so planned as to be a cyclopædia of information on flower gardening, fruit culture, trees, shrubs, stove and greenhouse plants, indoor decoration with plants, room and window gardening, garden design, town and city gardens, and cultivation of all kinds, both for the supply of the private house and the markets with flowers, fruit, and vegetables. The coloured illustrations, of which one is given every week, and the many engravings, are beautiful and suggestive. This journal, with a view to make it more accessible to all classes interested in the subject of which it treats, is now reduced from sixpence to fourpence per week.——We have received the first number of Ward & Lock's "Universal Instructor, or Self-Culture for All." It is to be a complete encyclopædia of learning, meeting the requirements of students of all classes, and characterised by such features as will, the publishers believe, give it a superiority over every similar undertaking. It seems a little too much like in intention a similar work published by Cassell & Co., but there is room for both.——The current number of *The Quarterly* includes an exceedingly interesting article under the title "Art-Collections." It should be farther elaborated and printed separately.——The new series of "The Magazine of Art" is published in monthly parts, and is enlarged by the addition of eight pages to each monthly part, commencing with part 19, which forms the first part of volume III. of the work. With the additional space thus given, the editor has been able to add many fresh features of interest.

Miscellanea.

The North London Hospital for Consumption.—On Saturday last the Duke and Duchess of Connaught visited Hampstead, and took part in the ceremony of laying the foundation-stone of the middle block of the new hospital for consumption at Mount Vernon. The site is on nearly the highest part of Hampstead, and the style of architecture adopted for the buildings is that of the French Renaissance of the seventeenth century. In plan the hospital is a compact rectangular structure, about 163 ft. long by 55 ft. 6 in. deep, and is intended for 110 patients. The wards on the first floor will be for women, and those on the second floor for men. On each of these two floors a day-room 35 ft. long is provided, and on the sunny side of the building are open arcades. The building is being carried out in sections, and the carcass of the western section, which embraces more than one-third of the whole, is now completed, and progress is being made with the internal finishing. The architect is Mr. T. Roger Smith, and the builders are Messrs. Higgs & Hill, of Crown Works, Lambeth.

Society of House Decorators.—On Tuesday evening last the first annual tea, *soirée*, and ball were held in Cleveland Hall, Cleveland-street, under the auspices of the Amalgamated Society of House Decorators and Painters, to help in establishing the principle of a superannuation fund for aged and disabled workmen, painters and decorators. There was a large attendance. The chair was taken by Mr. G. Shipton, general secretary of the society, who, speaking (as a vice-president of the Trades Congress Parliamentary Committee of the United Kingdom) of the Employers' Liability Bill, said that he hoped the employers would meet them in a friendly spirit, and, by subscribing to a fund voluntarily provided to meet cases of accident, render, if possible, an appeal to the law unnecessary.

The Nottingham Corporation Sewage Farm.—On the 14th inst. a number of the members of Nottingham Town Council, with some of the chief officials, by invitation of the Sewage Farm Committee, paid a visit to the farm at Stoke Bardolph, on the banks of the Trent, between Carlton and Burton Joyce. In 1872, the Leen Valley District Sewerage Board was created under an Act of Parliament, and this body combined Nottingham with the upper districts of the Leen Valley for sewerage purposes, and gave power to execute whatever works were necessary for a united system to deal with the sewage. The first act of the Board was to complete the system of sewerage of the Leen Valley, which was done at a cost of about 50,000*l.*, the sewage being thereby intercepted throughout the whole of the valley of the Leen from the north end of Bulwell to the south end of Nottingham, and cast into the river along with that of Nottingham. The next operation was to deal with the sewage so collected, and, in 1875, Mr. Tarbotton, the engineer to the Board, made a report, in which he recommended that the whole of the sewage should be dealt with by irrigation. About this time the extension of the borough was determined upon, and in 1877 the functions of the Leen Sewerage Board were merged in the Nottingham Corporation, who undertook the completion of the works which had been designed and determined upon by their predecessors. These works consisted in the construction of a gravitation outfall sewer from Nottingham to the land selected by the late Board and approved of subsequently by the Town Council, at Stoke Bardolph. The works consist of an outfall sewer from Sneinton to Stoke. Into this outfall sewer the higher portions of the town deliver their sewage by gravitation, but the lower portions of the town will deliver their sewage into it by pumping, which will be carried out in the Eastcroft, dealing with the whole of the sewage brought down the Leen Valley from Bulwell and Nottingham. The sewage will, therefore, be brought partly by gravitation and partly by pumping into the main gravitation sewer, along which it will flow down to Stoke fields, the large outfall sewer having been constructed at a cost of 35,000*l.*, commencing at Sneinton, and passing through the Colwick hills by means of a tunnel, two miles long, at the eastern extremity, delivering its contents upon the land at Stoke. This land consists of 638 acres 22 perches of porous gravel soil. The cost of the works already executed has been 70,000*l.*, but a further expenditure of 30,000*l.* is contemplated. The whole of the sewage will not be dealt with for some time, as the disposal of manufacturers' refuse is causing much difficulty. The present contributing population is near upon 200,000.

Yorkshire Association of Medical Officers of Health.—The annual meeting of the above association was held at Sheffield on the 19th. There was in connexion with it an exhibition of sanitary appliances and other objects of special interest to members. Among them were models and drawings of the destructor, concentrator, and carboniser, as used at Manchester and elsewhere. There was also a great variety of disinfectants, as manufactured by the Sanitas Company and others. Before the meeting the members visited the works of Messrs. Charles Cammell & Co., where they witnessed the rolling of an armour-plate; and the Union grinding-wheel. The general meeting of members was held in the Council Hall, and was presided over by Mr. S. W. North, of York. The annual report stated that the society now numbered sixty-seven members, and the committee earnestly desired that if possible the association should include the entire body of medical officers of health throughout the county. At the general meeting which was subsequently held, Dr. Hime read a paper on the recent outbreak of diarrhœa at Sheffield. Dr. Drew, of Chapeltown, read a paper on "Sanitation in Utopia," and Mr. Swann, the architect of the New Fever Hospital, explained the internal arrangements of that institution. The members dined together at the Wharncliffe Hotel.

Measures Bros. & Co. — Changes have been made in this firm (iron contractors and engineers) by mutual consent, and from the present date the business will be carried on in the London office, by R. J. & R. H. Measures, under the style of Measures Bros. & Co., as heretofore, and in the Manchester office by R. Swarbrick, as R. Swarbrick & Co.

Glasgow Sunday Society.—The meeting at Glasgow on the 25th inst. was large and enthusiastic, and the resolutions we have already printed were carried unanimously. Professor Tyndall, F.R.S., in the course of an elaborate and cogent presidential address, said: Sabbatical rigour has been tried, and the question is, have its results been so beneficent, so conducive to good morals and national happiness, as to render criminal our attempt to modify it? The advances made in all kinds of religious knowledge in this our day are enormous, and the public desire for instruction which the intellectual triumphs of the time inevitably arouses is commensurate with the growth of knowledge. Must this desire, I ask, which is the motive power of all healthy progress, be quenched or left unsatisfied, lest Sunday observances unknown to the Early Christians, repudiated by the heroes of the Reformation, and insisted upon for the first time during a period of national gloom and suffering in the seventeenth century, should be interfered with? Are we so much better than other nations, who have neglected to adopt our rules, that we can point to the working of these rules in the past as a conclusive reason for retaining them immovably in the future? The answer must be, no. My Sabbatarian friends, you have no ground to stand upon. I say friends, for I would far rather have you as friends than as enemies. You possess a strength and earnestness with which the world cannot dispense. But to be productive of anything permanently good that strength and earnestness must be built on the sure foundation of human nature. This is that law of the universe so often and so eloquently spoken of by your illustrious countryman, Mr. Carlyle, to quarrel with which is to provoke and precipitate ruin. Join with us, then, in our endeavours to turn our Sundays to better account. Back with your support the moderate and considerate demands of the Sunday Society, which scrupulously avoids interfering with the hours devoted by common consent to public worship. Open the museum, the picture-gallery, the library, the public garden as competitors to the public-houses. By so doing you will fall in with the spirit of your time, and row with instead of against the resistless current along which man is borne to his destiny. On the motion of Mr. Mark Judge, seconded by Professor Caird, a hearty vote of thanks was given to the Professor.——At a meeting of the London committee on Wednesday, a telegram was received from the Manchester Branch to the effect that it had been decided to again open the Royal Institution Exhibition on Sundays for a period of eight weeks, commencing November the 7th.

The Late Baron Visconti.—Baron Pietro Ercole Visconti, who died on the 14th inst., was for many years one of the most prominent figures in the archæological world of Rome. He was great-nephew of the celebrated Ennio Quirino Visconti, and nephew of the architect of the same name. Among the more important discoveries made under Visconti's directions as Commissioner of Antiquities, the *Times* correspondent in Rome mentions the temple of Cybele and Atys and other valuable results of the extensive excavations at Ostia; the guard-house of the seventh cohort of the Vigiles, near the Basilica of Saint Chrysogono; that portion of the ancient quays on the banks of the Tiber where the marble was landed and many hundred blocks lie buried where they had been disembarked; some very important tombs and the long-lost Basilica of St. Stephen on the Latin Way; and the completion of the excavation and clearing of the Appian Way.

The Whitby Jet Trade.—The Whitby jet trade, which has been in a depressed state for so many years, is again looking up. According to *Capital and Labour*, when the bad times came the Whitby jet ornament trade was one of the first of the fancy industries to suffer, and the fashion or the taste for jet ornaments as articles of mourning changed. Jet, however, now appears to be coming into favour again, not only for mourning purposes, but for ordinary adornment. On inquiry it would appear that the increased demand is by no means confined to England, but extends over France and Germany. The chief exportations, however, are to America. A few years ago endeavours were made, by the distribution of prizes, for specimens of superior work to improve the artistic character of works in jet produced in Whitby. We are curious to know what effect, if any, the steps then taken had.

Foot-Bridges over Streets.—The Society for the Prevention of Street Accidents are pursuing very philanthropic ends, but we doubt whether they are very practical in their aims. They lately waited upon the Lord Mayor for the purpose of urging upon him the importance of placing bridges at points in different thoroughfares where the traffic is very dense. We think his Lordship took a very common-sense view of the matter placed before him, pointing out to the deputation that very few persons would take the trouble of mounting and descending twenty or thirty steps when they could walk across a street, even at some personal risk. The Lord Mayor might have drawn the attention of the society to the fact that such a foot-bridge was tried about ten years ago in the Broadway, New York, and had to be taken down again, for the simple reason that no one would use it. The society would greatly promote its humane intentions by looking more closely after the principal cause of street accidents, reckless driving. Drivers, as a rule, will not budge an inch from their route when a foot-passenger is in their way, even if they do not drive too fast. —*Iron.*

The Chamberlain Memorial.—A memorial erected by public subscription to commemorate the exceptional services rendered to Birmingham by Mr. Chamberlain, the President of the Board of Trade, during his connexion with the Town Council, was publicly unveiled and presented to the town on the 26th inst. The memorial, designed by Mr. J. H. Chamberlain, takes the form of a monumental fountain in the Gothic style, consisting of a square stone shaft, springing from a low flight of steps and terminating at a height of 65 ft. in a richly-carved and crocketted octagonal spire. Octagonal projections form the upper part of the shaft, carrying four smaller pillars surmounted by gabled arches, with pinnacles at the angles of the gables. The spaces between the main arches are filled with ornamental panelling, partly in carved stone, and partly in mosaics of various designs. A medallion portrait of Mr. Chamberlain, executed in Sicilian marble by Mr. Thomas Woolner, R.A., fills a large circular panel on the south side, and round the base of the main shaft are grouped three large semicircular basins, the lowermost of which is from 15 ft. to 16 ft. in diameter. The material of the memorial is white Portland stone, and the cost is a little over 2,000*l.*

A Trade Book.—Messrs. Walker & Son, house-furnishers, of Bunhill-row, have issued a very good one. It contains nineteen page-views of different rooms, fitted up with much congruity and taste in the prevalent style. The price of every article is given in each case, to the extent of nearly 1,000 items.

TENDERS

For the erection of Smack Boys' Home, Royal Harbour, Ramsgate. Mr. Alfred R. Pite, architect. Quantities by Mr. Joseph Rookwood:—

Newby	£2,777 0 0
Paramor	2,320 0 0
Mitchell	2,300 0 0
Hooper	2,280 0 0
Evans	2,165 0 0
Nicholls	2,139 0 0
Shrubsole	1,948 0 0
Denne	1,940 0 0
Martin	1,880 0 0

For various alterations at the Tally Ho public-house, No. 6, Willow-walk, Fortess-road, Kentish-town, for Messrs. Watney & Co. Mr. James Robert Furniss, architect:—

Hockley	£2,335 0 0
Whitelaw	2,045 0 0
Dixon	1,883 0 0
Lamble	1,867 0 0
Durnford	1,800 0 0
Taylor	1,777 0 0
White	1,754 0 0
Anley (accepted)	1,650 0 0

For the erection of new schools, at Farrance-street, Tower Hamlets Division, for the School Board for London. Mr. E. R. Robson, architect. Quantities by Messrs. Northcroft, Son, & Neighbour:—

F. & F. J. Wood	£10,860 0 0
Higgs & Hill	9,068 0 0
Shepherd	9,045 0 0
Harris & Wardrop	8,995 0 0
Boyce	8,989 0 0
Jerrard	8,827 0 0
Atherton & Latta	8,800 0 0
Cox	8,758 0 0
Kirk & Randall	8,749 0 0
Hook & Oldrey	8,534 0 0

For new guest-house and completion of the cloister of St. Mary's Priory, Torquay, for the Nuns of the Third Order of St. Dominic. Messrs. J. A. Hansom & Son, architects:—

	1st Section	2nd Section.	3rd Section.
W. & J. Eddles	£503 5 0*	£590 10 0	£620 10 6

* Accepted for First Section.

For the erection of a warehouse in St. Thomas-street, Borough, for Messrs. G. R. Herron & Son. Mr. William Wimble, architect:—

Falkner	£6,835 0 0
Brass	6,463 0 0
Scrivener	6,345 0 0
Laurence	6,181 0 0
Ashby & Horner	6,172 0 0
Croaker	6,043 0 0
Morter	5,943 0 0

For reinstating Fairlawn, St. Leonard's-on-Sea, for Mr. W. M. Berkley. Messrs. Fowler & Hill, architects. Quantities by Messrs. Fowler & Hugman:—

White, St. Leonard's	£1,443 15 8
Rodda, St. Leonard's	1,400 0 0
F. Cruttenden, St. Leonard's	1,290 0 0
Eldridge & Cruttenden, St. Leonard's (accepted)	1,130 0 0

For repairs to the interior of St. Stephen's Church, Walbrook. Mr. Thomas Milbourn, architect:—

Dove, Bros.	£745 0 0
Sabey & Sons	723 0 0
Mansfield & Son	540 0 0
Macey & Son	536 0 0
Crabb	499 0 0
Conder	449 0 0
Colls & Son	410 0 0
Repairs to Gas-fittings.	
Richards	£71 10 0
Vaughan & Brown	59 0 0

For the erection of new schools, at Sidney-road, Hackney-wick, for the School Board for London. Mr. E. R. Robson, architect. Quantities supplied by Mr. T. Thornton Green:—

Staines & Son	£18,273 0 0
Wood, Bros.	17,912 0 0
Booth & Sons	16,414 0 0
Brass	16,257 0 0
Higgs & Hill	15,998 0 0
Braid & Co.	15,994 0 0
Hook & Oldrey	15,519 0 0
Kirk & Randall	14,940 0 0
Nightingale	14,882 0 0
Pritchard	14,728 0 0
Grover	14,483 0 0
Cox	14,460 0 0
Boyce	14,463 0 0

For the erection of seven shops in the Albany-road, five stables in Albany-mews, and building five shops on Forecourts in Camberwell-road, for Mr. A. Stedall. Mr. George Edwards, architect. Quantities supplied by Mr. Henry Lovegrove:—

	Allow for Old Materials.
Ashby, Bros.	£11,193 0 0 ..... £80
Woodward	10,757 0 0 15
Colls & Sons	10,750 0 0 100
Nightingale	9,783 0 0 200
Downs & Co.	9,655 0 0 56
Mortar	9,608 0 0 125
Hobson	9,573 0 0 30
Scrivener & Co.	9,372 0 0 50
Lidstone & Son	9,365 0 0 50
Thompson	9,333 0 0 80
Tarrant & Sons	9,180 0 0 100
Stimpson & Co.	8,877 0 0 90
Goad	8,799 0 0 50
Cullum	8,599 0 0 60
Martin, Wells, & Co.	8,430 2 0 81
Green (accepted)	7,946 0 0 186

For alterations to Nos. 21 and 23, Newington-causeway. Mr. George Edwards, architect:—

Martin, Wells, & Co.	£435 0 0
Laidlor	419 0 0
Richardson	350 0 0
Stimpson & Co. (accepted)	321 0 0

For offices and residential chambers, Westminster, for Messrs. R. C. & J. B. Nichols. Mr. W. L. Baker, architect. Quantities supplied by Mr. T. Nixon:—

Hatton & Co.	£17,900 0 0
Foxley	17,900 0 0
Ashby, Bros.	16,940 0 0
Higgs & Hill	16,690 0 0
Conder	16,100 0 0
Chappell	15,898 0 0
Macey & Sons	15,799 0 0
Morter	15,743 0 0
McManus	15,700 0 0
Fish	15,520 0 0
Kirk & Randall	15,240 0 0

For shop and dwelling-house, for Mr. C. Hardiman, Southampton. Mr. Arthur Martin, architect. Quantities by the architect:—

Sanders	£525 0 0
Laver	489 0 0
Rowland (accepted)	420 0 0

For erection of villa residence and stabling, &c., at Steeple Claydon, Bucks, for Mr. John Cross. Mr. F. H. Barfield, architect:—

Franklin, Deddington	£1,188 0 0
Marshall & Boyce, Buckingham	1,028 0 0
Cooper, Aylesbury (accepted)	806 10 0

For the erection of four shops at Loughborough Junction. Mr. A. Large, architect:—

Head	£1,730 0 0
Scutt	1,680 0 0
Woodhouse	1,675 4 0
Hobern	1,665 0 0
Pictor	1,599 0 0
Baxter (accepted)	1,554 0 0

For drainage works to eleven houses, Union-road, Clapham-road. Mr. K. D. Young, surveyor:—

R. & E. Smith	£335 0 0
Catchpole	324 0 0

For addition to workhouse, for Kensington Board of Guardians:—

Johnson	£175 0 0
Lorden	168 10 0
Tye & Bartlett	168 10 0
Maton	139 0 0
Angood	133 0 0
Mills	105 0 0

For pulling down and rebuilding No. 1, Queen-street, Spitalfields, for Mr. Edward Tilney. Mr. Edward Brown, architect:—

Hawkins	£375 0 0
Skipper	333 0 0
Belcher & Ullmer (accepted)	284 0 0

For alterations at the Prince Albert, Maps-street, Bethnal-green, for Mr. R. Hillier. Mr. Edward Brown, architect:—

Salt	£1,145 0 0
Marr	1,113 0 0
Skipper (accepted)	1,015 0 0
Gasfitters' Work.	
Steadman	£125 0 0

For alterations to the Hampshire Hog, Berwick-street, Soho, for Mr. Stanton. Mr. Edward Brown, architect:—

Gritton	£855 0 0
Marr	777 0 0
Wood	602 0 0
Jenkins, Reading (accepted)	482 0 0
Pewterers' Work.	
Davis	£98 0 0
Phillips	88 0 0
Rogers (accepted)	74 15 0
Gasfitters' Work.	
Winn	£155 0 0
Christian	97 0 0
Steadman (accepted)	78 0 0

Richmond Vestry.—The Tender of Messrs. R. Downs, Kennedy, & Company, contractors and lightermen, &c., of 70, New Corn Exchange, Mark-lane, was accepted for Kent Flints.

TO CORRESPONDENTS.

H. J. & Co. (we cannot usefully reply on *ex parte* statements. Still, as the matter is stated in letter, carving is not included in the contract).—Llandudno (several letters on the subject of our statement shall have consideration).—Beta (to take the overflow pipe from the soft-water tank into the fresh-water well is decidedly objectionable and the arrangement should be altered).—J. P. (the elevation should follow the plan, not the plan the elevation. "Commodity" comes before "Delight").—W. N. (simply because it was not in the list sent to us).—H. C. S. (send address).—O. H. L.—G. B. T. & Co.—H. & J.—S. H.—J. M. Y.—U. & G.—F. & D.—H. S.—T. T. M.—R. G.—T. T. G—J. M. W.—G. R.—H. & O.—E. J. T.—R. & R. S.—P. J. MeM.—W. G. S.—F. E.—T. M.—G. P.—A. G.—M. S. & M.—C. R.—C. C.—A. S.—E. A. H.—S. H.—W. C. T.—M. D.—J. R. F.—A. M.—J. T. C. H. S. G.—T. R.—J. B.—J. A. H. & Son.—S.—J. S. H.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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